



TECHNICAL MANUAL

BALDWIN ORGANS

**Interlude
MODEL
124 SERIES**

T E C H N I C A L M A N U A L

MODEL 124 SERIES ORGAN

INDEX

NOTE: Manual Reprinted with reduced and/or updated material causing elimination of some page numbers. Pages bear original page numbers for future reference. All original material and/or improved additions and revisions are included.

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Interlude specifications*

Solo

16' Flute
16' Cello
16' Saxophone
8' Flute
8' String
8' Clarinet
Flute Accent
Reed-String Accent

Accompaniment

8' Diapason
8' Flute
8' String
4' Flute

Pedals (124A)

Bass Soft
Bass Medium
Bass Full

Pedals (124B)

String Bass
Pedal — Loud-Soft
Pedal Sustain

Muted Reed (124B only)

Continuously Variable

Vibrato

Light-Full

Reverberation

Tone Control

Bright-Deep

AutoRhythm (124A only)

Basic Rhythms — Waltz,
Fox Trot, Swing, Rock,
Latin
On-Off
Tempo — Continuously
Variable
Rhythm Volume —
Continuously Variable
Downbeat Indicator
Light

WonderChord

(124B only)
Rhythm Patterns —
Waltz, Fox Trot, Swing,
Rock, Latin
On-Off
Chord Sustain
Rhythm Only
Tempo — Continuously
Variable
Rhythm Volume —
Continuously Variable
Downbeat Indicator
Light
Major-Minor Bar

Cassette Tape

Player/Recorder

(optional; model
124B only)

Manuals: 44-note solo
and accompaniment
manuals

Pedals: 13-note
pedalboard

Amplification: A self-
contained, transistorized,
single-channel system
with 25 watts (rms)
of power.

Headphone Jack

Dimensions: Height 36",
Depth 24¼", Width 45½"

Weight: 176 pounds

Style: Contemporary

Finish: Walnut

*Interlude Organs are designated the Model 124 Series. The 124A is Interlude with AutoRhythm; the 124B, Interlude with WonderChord. The letter "C" is added to the model number when the organ is equipped with cassette.

VOLUME LEVEL SETTING PROCEDURE

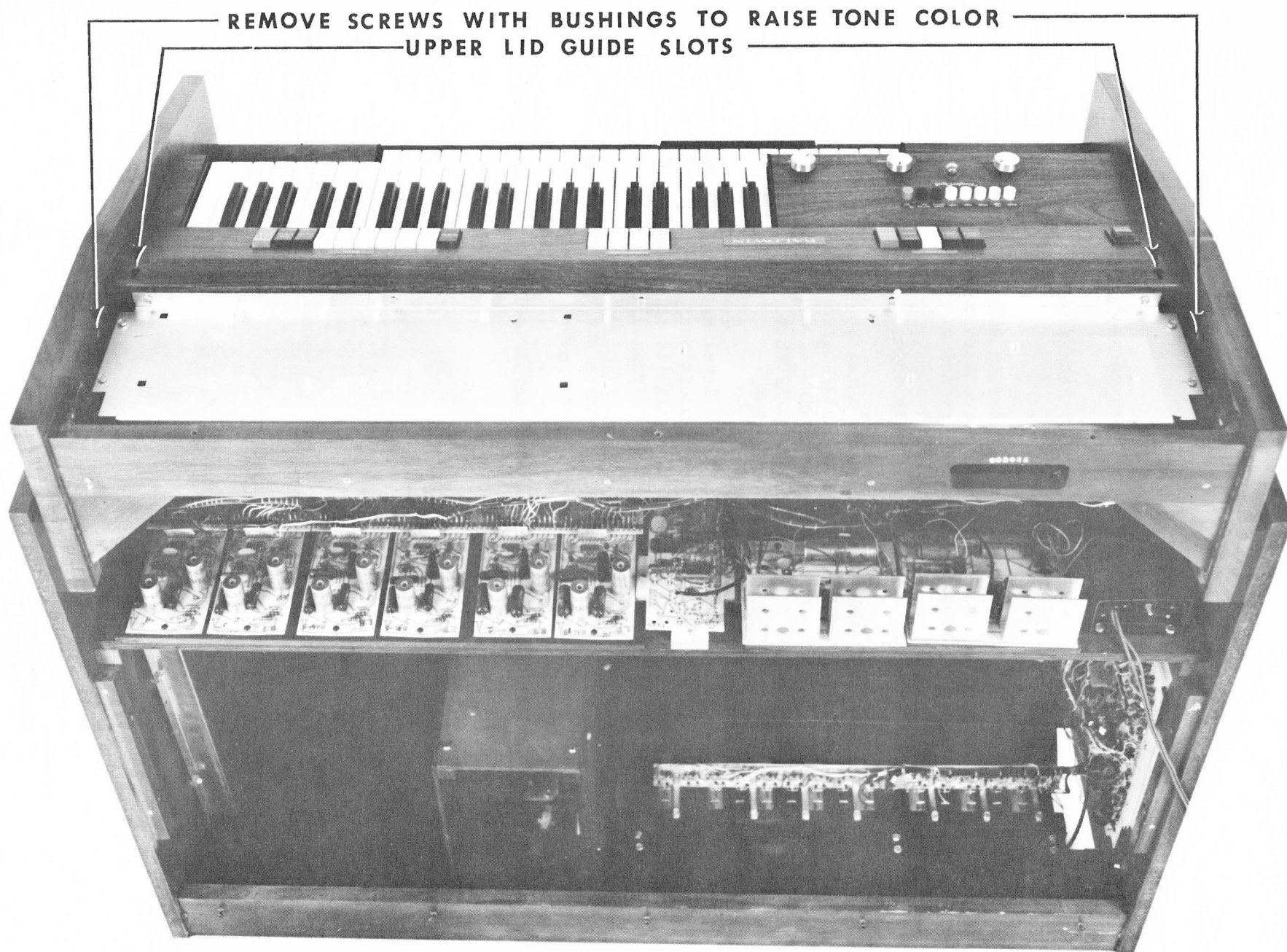
FOR MODEL 124 SERIES ORGAN

1. Depress all the manual stops including Pedal Sustain and Accent stops. Do not include Muted Reed or Reverb. Tone control tab should be in Bright position.
2. Depress the Expression Pedal fully down.
3. Play C-E-G-C chord (middle C and notes above middle C) on both SOLO and ACCOMPANIMENT manuals; also play low C on PEDAL. Keys to be played are indicated with arrows on Drawing D579-376. Set the VOLUME LEVEL to set the voltage across the 12" speaker to 6.0 V RMS.

It should be noted that the above level setting will give a satisfactory volume for most conditions; however, it may be necessary to adjust setting slightly to compensate for individual taste or acoustical environment.

NOTE: Volume Level control is located on the tone color and can be reached from the back of the organ (Fig. 19).

On N124 series Volume Level control is located on the tone color board (Fig. 45).



REMOVE SCREWS WITH BUSHINGS TO RAISE TONE COLOR
UPPER LID GUIDE SLOTS

FIG.1 — ORGAN TOP VIEW — UPPER LID REMOVED

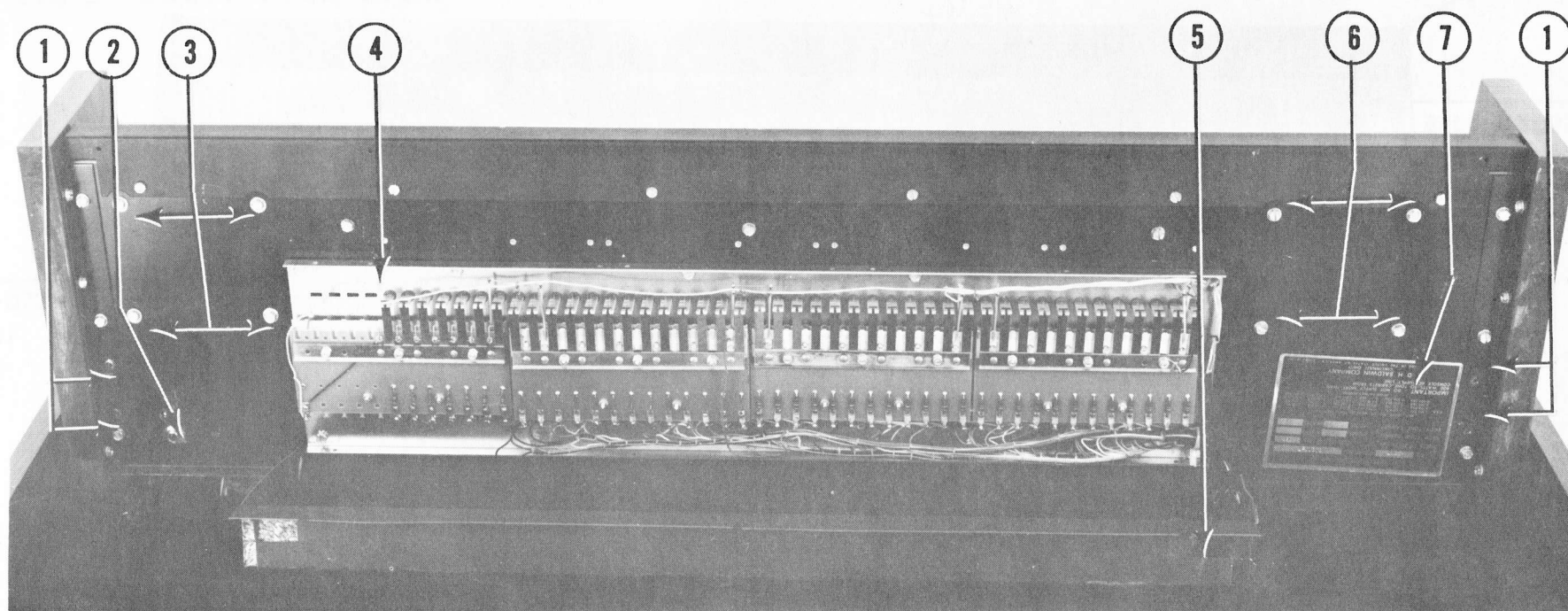


FIG. 2 - ACCOMPANIMENT MANUAL UNDERSIDE VIEW

ITEM	DESCRIPTION	PART NUMBER
1	REMOVE FOUR (4) SCREWS TO RAISE SOLO MANUAL	
2	PHONE JAX ASSY. (UNINSULATED MOUNTING)	B500-053451
3	REMOVE FOUR (4) SCREWS TO REMOVE ACCOMP. BASS KEYCAP	
4	ACCOMP. SWITCH ASSY.	D500-053195
5	SWITCH COVER	D502-052385
6	REMOVE FOUR (4) SCREWS TO REMOVE ACCOMP. TREBLE KEYCAP	
7	MODEL AND SERIAL NUMBER NAMEPLATE	

MUSIC DESK
PLEXIGLASS
C501-053450

REVERB CONTROL
VOLUME CONTROL

BACK
PANEL
D157-053597

POWER
CORD
B508-027658

FIG. 3 - ORGAN BACK VIEW

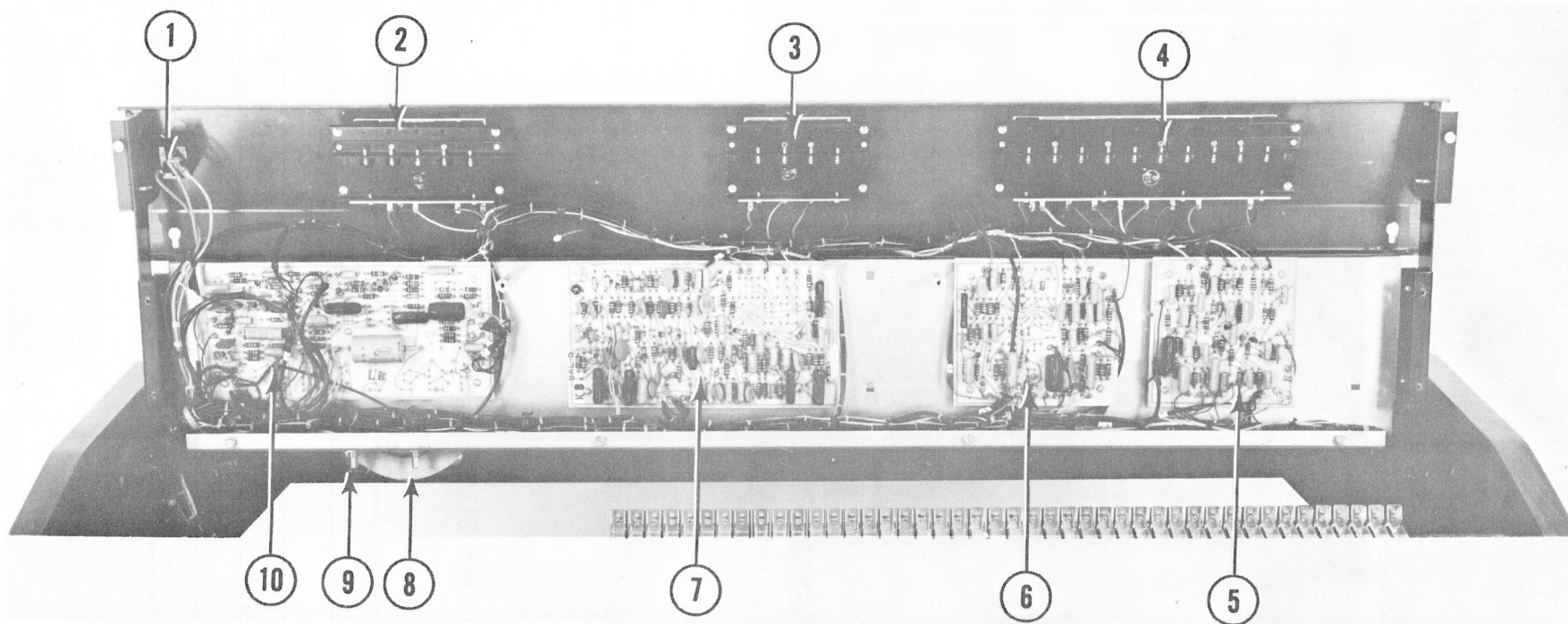


FIG. 4 - TONE COLOR RAISED

ITEM	DESCRIPTION	PART NUMBER
1	POWER SWITCH	B506-052168
2	VIBRATO & PEDAL STOP TAB SWITCH ASSY. - 124A & AC	C500-053371
	- 124B & BC	C500-053577
3	ACCOMP. STOP TAB SWITCH ASSY.	B500-053099
4	SOLO STOP TAB SWITCH ASSY.	C500-053286
5	SOLO FILTER BOARD ASSY.	B500-053465
6	PEDAL & ACCOMP. FILTER BD. ASSY. - 124A & AC	B500-053185
	- 124B & BC	B500-053189
7	RHYTHM VOICE BOARD ASSY.	C500-053499
8	REVERB LEVEL SET POTENTIOMETER (100K OHMS)	B509-040783
9	VOLUME LEVEL SET POTENTIOMETER (100K OHMS)	B509-040783
10	PREAMPLIFIER AND REVERB PREAMP BOARD ASSY.	C500-053421

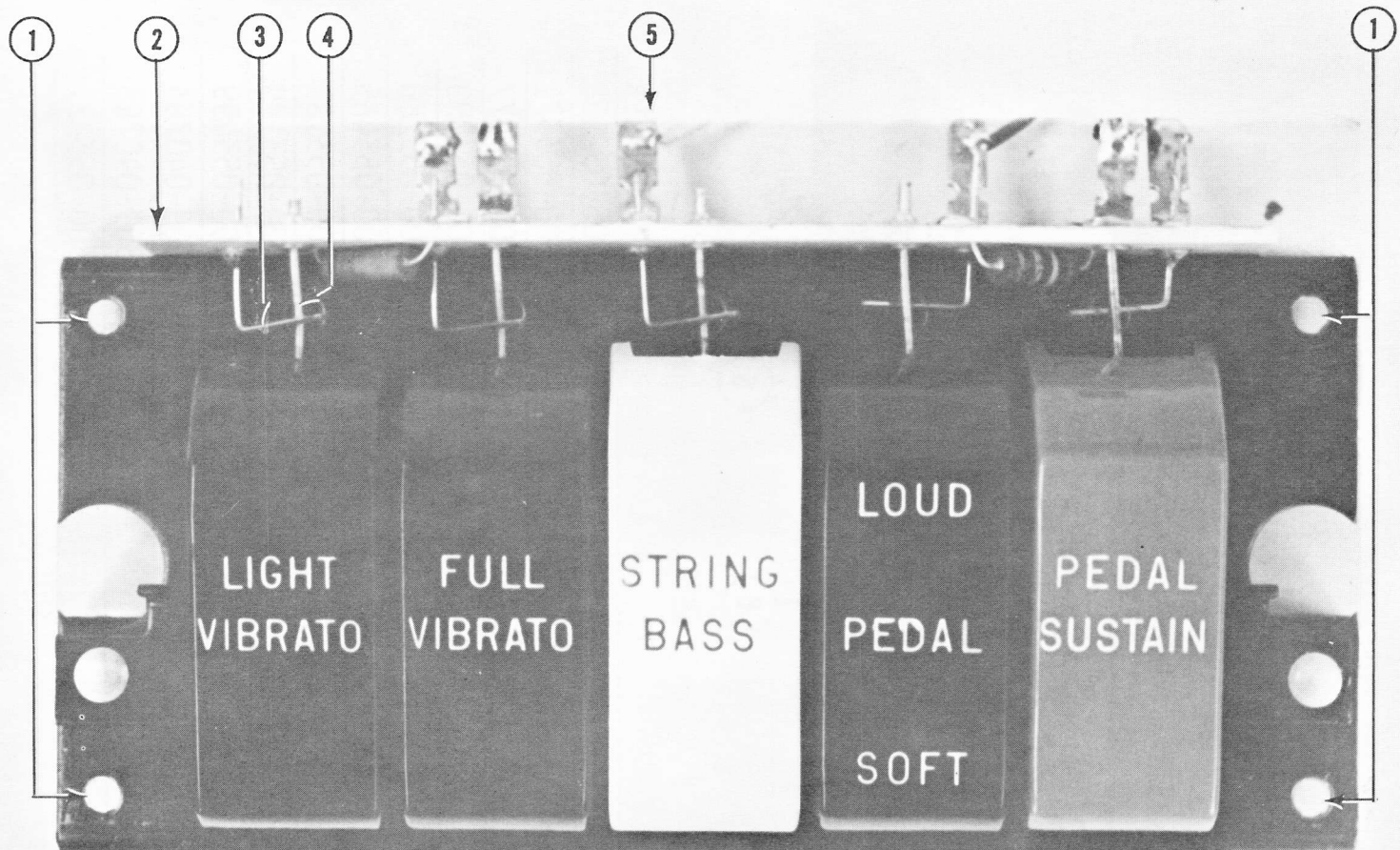


FIG. 5 - STOP TAB SWITCHES DISASSEMBLY

ITEM	DESCRIPTION	PART NUMBER
1	SWITCH TAB ASSY. MOUNTING HOLES	
2	PEDAL TONE COLOR SWITCH BOARD ASSY.	B506-053234
3	CONTACT WIRE	A506-037787
4	CONTACT SPRING	A506-033399
5	PEDAL SWITCH TAB ASSY. (124B)	C500-053577

DISASSEMBLY PROCEDURE

1. Back (Fig. 3)

- a. The back is secured by fourteen (14) screws. Remove the top nine (9) screws and loosen the remaining five (5) screws across the bottom slots. Lift upward and remove.

2. Lid Assembly (Fig. 19)

- a. Follow Step 1a.
- b. Remove three (3) screws securing the back side of the lid to the top rail (Fig. 19) and slide the lid toward front of the console in order to clear the lid guide slots. Lift lid assembly from console.

3. Tone Color Assembly

NOTE: Beginning with #12266 tone color board must be loosened before raising tone color panel or board will break:

- a. Follow Steps 1 and 2.
- b. Prior to #12266 ONLY - (Fig. 3)
 1. Remove two (2) screws with rubber bushings from each side of console (Fig. 1). The tone color panel, hinged in the rear, will now pivot upward from the normal position.
 11. Remove tone color box cover or pan by loosening the four (4) lower screws and removing the six (6) remaining screws.
- c. Beginning with #12266 - (Fig. 38)
 1. Follow Step 1 - Tone Color board hangs down from Tone Color panel assembly and component side is exposed. Two (2) screws secure board to panel.
 11. On some organs, the Tone Color board is attached to the top of the lower frame with four (4) screws.
 111. Loosen tone color board assembly FIRST, then to raise the tone color panel - proceed as in 3b 1 and 11.

4. Tone Color Solo Switch Assembly (Figs. 2, 5 & 20)

- a. Follow Steps 1 and 2 and raise tone color as in Step 3.
- b. Tab mounting block may be removed by removing four (4) screws from underside of tone color assembly (Fig. 2); access to the switch contacts may now be accomplished.
- c. Tab may be removed by removing tab detent spring from tab throw adjusting screw and lifting tab out.
- d. The Solo tab throw adjustment screws are accessible for adjustment of tab throw.

5. Solo Keys and Keyswitches

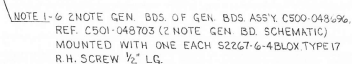
- a. Follow Steps 1, 2 and 3.
- b. Keys may be removed by loosening mounting screw of a key channel. Sharp or black key must be removed first (Fig. 10).
- c. Access to Solo keyswitches may be obtained by removing the four (4) screws, two (2) at the bass end and two (2) at the treble end, beneath Accompaniment manual (Fig. 2). The Solo manual, hinged in the rear, will now pivot upward from the manual position.
- d. Remove dust cover over keyswitches by loosening three (3) screws from top and three (3) screws from the bottom of the dust cover. Screws are fitted in slotted holes, therefore, the dust cover must be removed by lifting.
- e. Keyswitch assembly may be disassembled by removing nuts from switch posts.

6. Accompaniment Keys and Keyswitches

- a. Follow Steps 1 and 2, raise tone color as in Step 3 and raise Solo manual as in Step 5c.
- b. Keys may be removed by loosening mounting screw at the rear of key channel. Sharp or black key must be removed first.
- c. Access to Accompaniment keyswitches is accomplished by removing cover. Cover is removed by loosening three (3) screws from the front of keyswitches. Keyswitches are located beneath Accompaniment manual (Fig. 2).
- d. Keyswitch assembly may be disassembled by removing nuts from switch posts.

7. Solo Bass Keycap Assembly (Figs. 2, 11 & 18)
 - a. Follow Steps 1 through 3 and raise Solo manual as in Step 5c.
 - b. Solo bass keycap assembly may be removed to servicing position by removing four (4) screws with washers on the underside, which secure Solo bass keycap assembly to the Solo manual assembly (Fig. 11).
 - c. Push button switch assembly may be removed by removing two (2) screws from the side mounting bracket (Figs. 22 & 29).
8. Accompaniment Bass or Treble Keycap (Figs. 2 & 18)
 - a. Follow Steps 1 through 3 and raise Solo manual as in Step 5c.
 - b. Remove four (4) screws with washers from the underside of Accompaniment manual.

NOTE: For models with cassette (C models), follow Step 14 to obtain access to Accompaniment treble keycap securing screws.
9. Expression Pedal Assembly
 - a. Follow Step 1.
 - b. Remove the two (2) wood screws which secure the expression pedal assembly to the rear bottom board of the console.
 - c. Pull the expression pedal assembly toward the rear of console in order to clear the screw from slotted hole and lift out.
10. Reverb Unit (Figs. 14 & 19)
 - a. Follow Step 1.
 - b. To remove reverb unit, remove four (4) screws securing unit to mounting bracket on treble end of console.
11. Pedal Clavier (Figs. 19, 21, 27 & 30)
 - a. Follow Step 1.
 - b. Remove cover from pedal switches and remove leads to pedal circuit board (Figs. 21 & 30).
 - c. Remove six (6) screws securing clavier to bottom board, tilt console slightly backward, press natural keys down until sharp keys clear front of case and remove the clavier from the rear of console.
12. Auto Rhythm Trigger Board Assembly (124A & AC)
 - a. To gain access to the Auto Rhythm Trigger board assembly, remove the back (Step 1).
 - b. The unit is located on the bass end of console above the pedals (Fig. 21). Remove by disconnecting plugs, then remove one plastic extrusion securing the board to console and slide board out.
13. WonderChord Board Assembly (124B & BC)
 - a. To gain access to the WonderChord board assembly, remove back (See Step 1).
 - b. WonderChord board assembly is located on bass end of console above the pedals (Fig. 30). To remove, disconnect plugs, then remove two (2) plastic extrusions securing board to console and slide board out.
14. Cassette Unit (124AC & 124BC)
 - a. Remove plugs from front of cassette (Fig. 37).
 - b. Remove two (2) screws securing cassette to drawer - bottom front and bottom rear.
 - c. Pull drawer forward and lift cassette out.
 - d. To remove cassette drawer, remove four (4) screws securing drawer to keyboard.
15. Real Rhythm Assembly (125R) - (Fig. 38)
 - a. Follow Step 1.
 - b. Disconnect plugs and remove two (2) screws securing unit to side panel.

[illegible]

PART DISTRIBUTION					
S.N.	D.E.S.	D.W.A.	F.A.T.	D.E.L.	D.W.
	98L				
FILE	DL	CON.	98L 180	D.E.L.	D.W.

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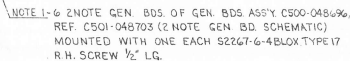
DECIMAL 2500

AMBLE 25 10"

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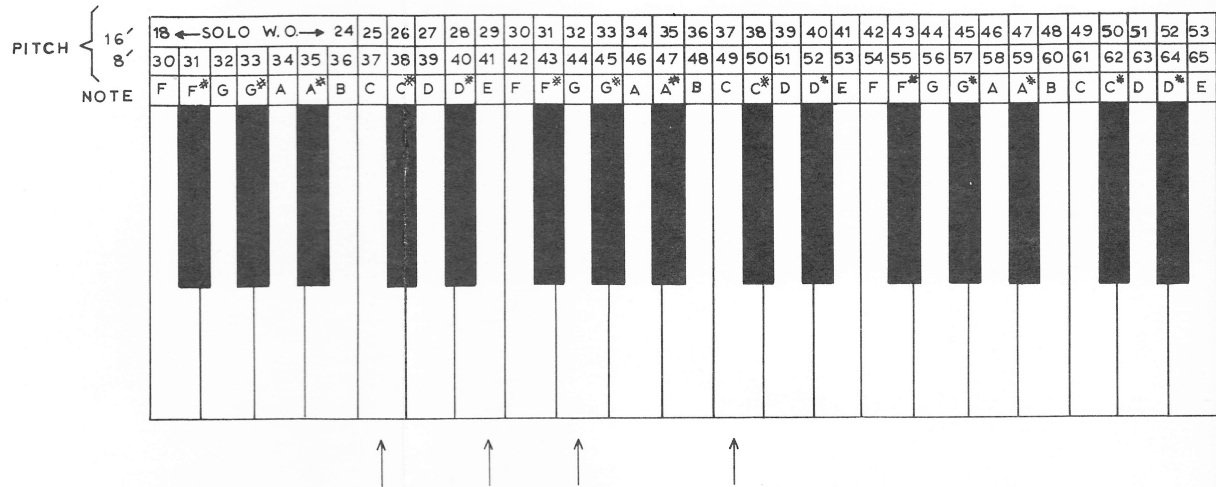
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 CINCINNATI, OHIO

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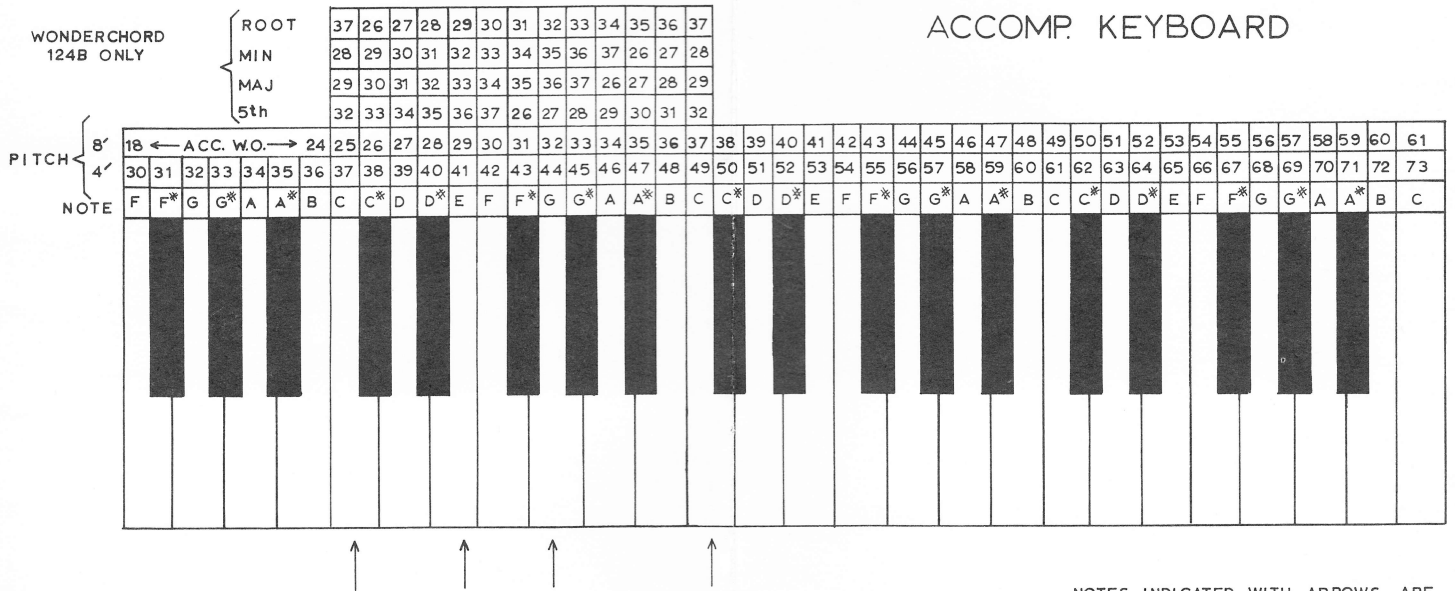
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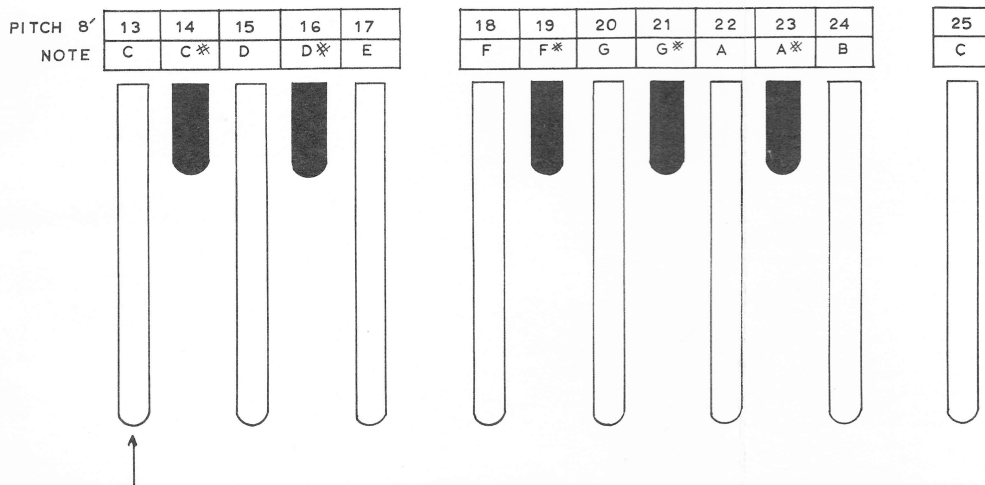
SOLO KEYBOARD



ACCOMP. KEYBOARD



PEDALS



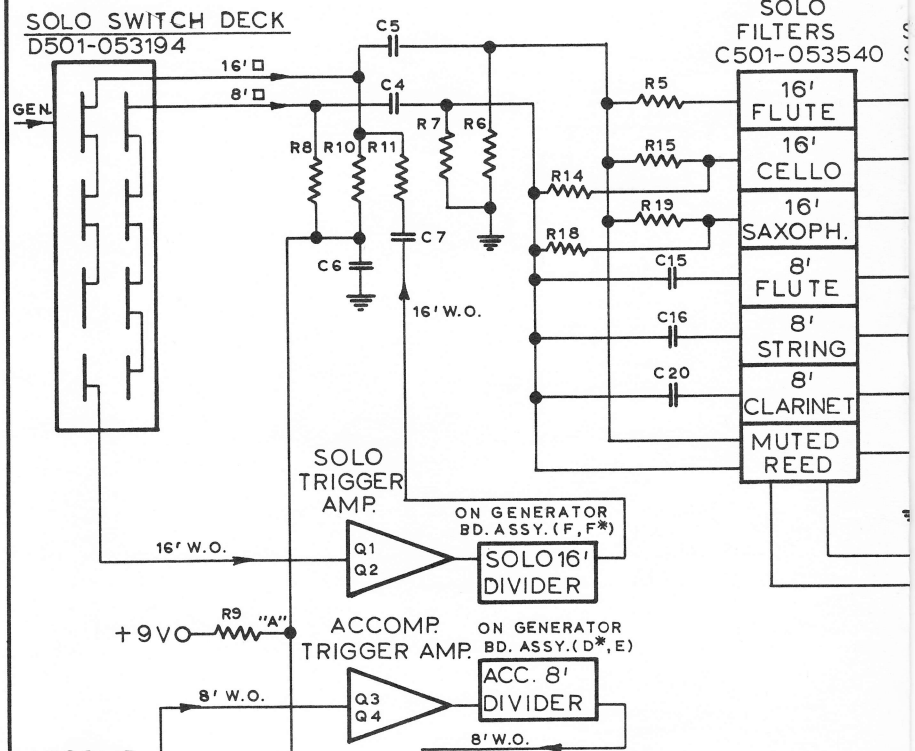
NOTES INDICATED WITH ARROWS ARE USED WHEN SETTING VOLUME LEVELS

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CIN.	GR.	CON.

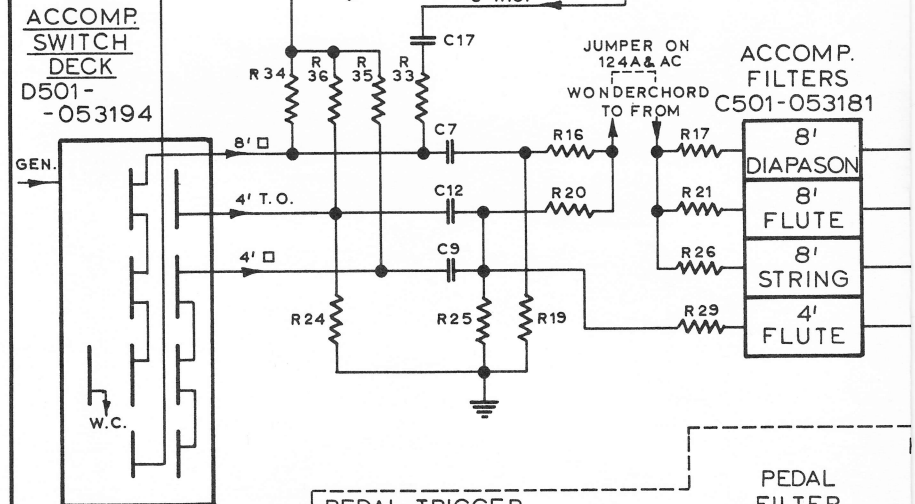
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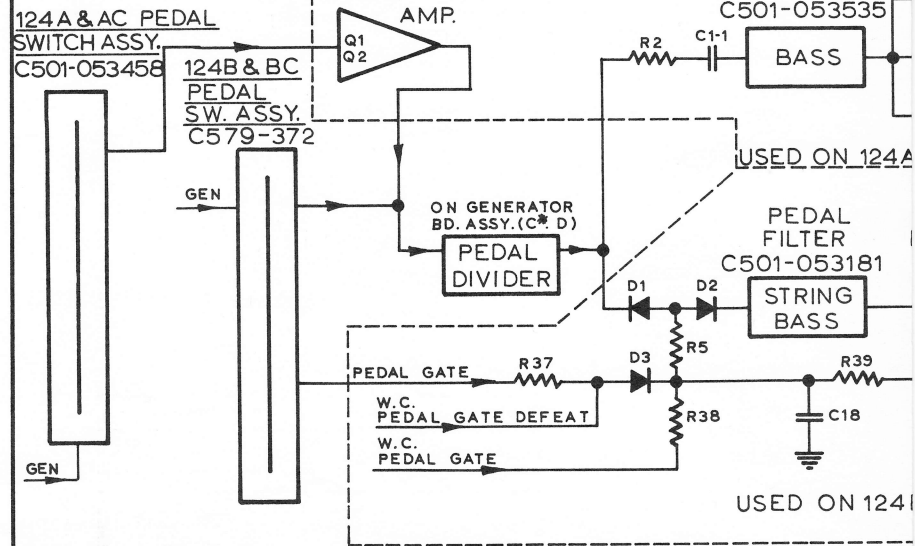
SOLO SWITCH DECK
D501-053194



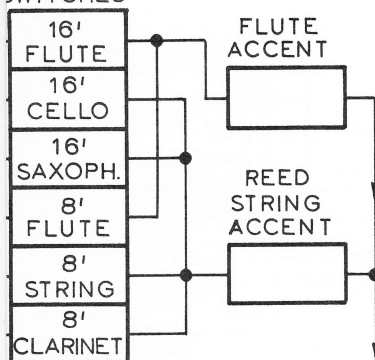
ACCOMP. SWITCH DECK
D501-053194



124A & AC PEDAL SWITCH ASSY.
C501-053458

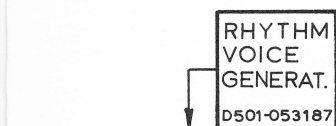


SOLO TAB SWITCHES

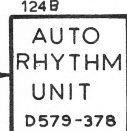
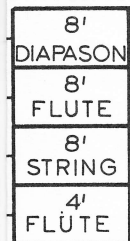


MUTED REED
R25 D501-053950

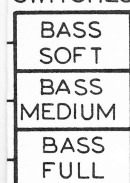
MUTED REED CIRCUIT
INCLUDED ON 124B & R
MODELS ONLY



ACCOMP. TAB SWITCHES

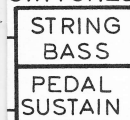


PEDAL TAB SWITCHES



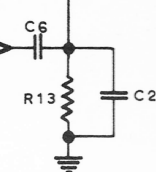
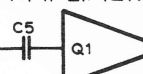
& AC MODELS ONLY

PEDAL TAB SWITCHES



B & R MODELS ONLY

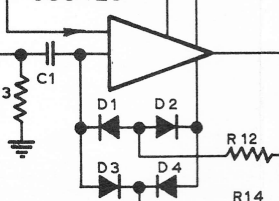
PEDAL FILTER
AMPLIFIER



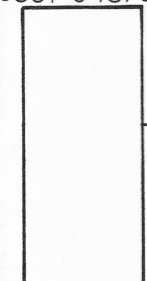
TO ALL KEYSWITCH DECKS

TONE
DEEP/BRIGHT

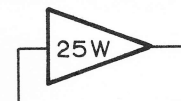
PREAMP
C501-053425



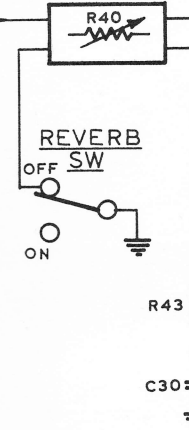
GENERATORS
C501-048703



POWER
AMPLIFIER
C501-051929



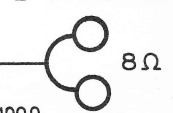
REVERB
CIRCUIT
C501-053425



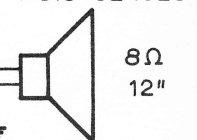
REVERB
OFF ON
SW



EARPHONES



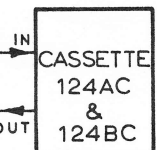
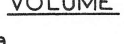
SPEAKER
A513-024925



TWEETER
(124R)

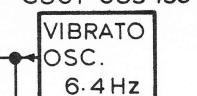


VOLUME



CASSETTE
124AC &
124BC

ACCESSORY
BOARD
C501-053439



VIBRATO
FULL
LIGHT

VIBRATO
OSC.
6.4 Hz

RECORD OF CHANGE

PRINT DISTRIBUTION						MODEL 124 SERIES BLOCK DIAGRAM			
B.V.	D.E.Q.	BOULD.		B.S.L.		DATE	2-24-72	BY	IT.
CIN.	GR.	CON.	FAY	B.E.I.	CAN.	APP'D.	USED ON	DWN. SCALE	NEXT ASSEM.
ALL DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF THE D. H. BALDWIN COMPANY AND MUST BE RETURNED TO IT. ALL SPECIFICATIONS ARE CONFIDENTIAL AND ARE NOT TO BE DISCLOSED TO ANY PERSONS OTHER THAN THOSE TO WHOM THEY ARE SENT. NO DRAWINGS, SPECIFICATIONS OR OTHER DATA BELONGING TO THE D. H. BALDWIN COMPANY WHICH MAY BE FURNISHED TO MANUFACTURERS OR OTHERS FOR ANY PURPOSE ARE TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.						FINISH	REQ.	SUPERSEDES	REV.
						D. H. BALDWIN CO. CINCINNATI, OHIO	C	579-377	A

UNLESS OTHERWISE SPECIFIED
TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± .015 ANGLE ± 1/4°

2 NOTE GENERATOR BOARD

The tone generation system consists of six (6) two note generator board assemblies which produce 49 frequencies (notes) in the range from C₃ (Note #25) at 130.8 Hz to C₇ (Note #73) at 2093.0 Hz.

Each 2 note generator sub assembly is of similar layout and consists of two master oscillator circuits and an integrated seven stage bipolar frequency divider. The generators are continuously operating when the organ is turned on, supplying frequencies to the Solo, Accompaniment and Pedal keyswitch decks.

MASTER OSCILLATOR: (Refer to Generator Board Schematic C501-048703)

The master oscillator circuit consisting of an NPN silicon transistor (Q1) and associated circuitry is an L-C type oscillator, which is relatively insensitive to climatic temperature variation.

Highest frequency notes (top octave) are produced by the master oscillators which are accurately factory preadjusted and can be retuned by means of a tuning slug. Master oscillators produce frequency range from C₇ (Note #73) at 2093.0 Hz to C₆ (Note #62) at 1108.7 Hz. The above frequencies are also applied to integrated frequency dividers where they are divided in half by each stage, so creating a total of four (4) octavely related frequencies.

Vibrato oscillator frequency of 6.4 Hz, from the accessory board assembly, is applied via R5 resistor to the base of Q1 master oscillator transistor, which modulates the master oscillator frequency and produces the vibrato effect. Resistor R1 in the master oscillator circuit is factory preselected to accurately control the "Q" of the resonant circuit which assures a uniform vibrato extent for all master oscillators.

FREQUENCY DIVIDERS

The frequency dividers (FD) are bipolar integrated circuits consisting of seven (7) dividers. Referring to Schematic Diagram C501-048703, master oscillator (M.O. #1) output is applied to the input of FD #3 with its output internally connected to FD #4 input. Output of FD #4 is externally connected to FD #6 input.

Master oscillator (M.O. #2) output is applied to the input of FD #1 with its output internally connected to FD #2 input. Output of FD #2 is externally connected to FD #5 input.

The last divider stage, FD #7, on the 2 note generator board assembly is used for the following circuits:

Board #1	- C# & D	- FD #7	- used for Pedal Divider
#2	- D# & E	- FD #7	- used for Accompaniment W.O. (Wipeout) Divider
#3	- F & F#	- FD #7	- used for Solo W.O. (Wipeout) Divider
#4	- G & G#	- FD #7	- not used
#5	- A & A#	- FD #7	- not used
#6	- B & C	- FD #7	- used for 4th C Divider Note #25 (C ₃)

Each integrated circuit divider supplies the output signal from an internal emitter follower, acting as a buffer stage, in order to obtain the necessary low output impedance. The negative generator supply voltage (-5V) supplies the emitter followers through the resistor pack 4.7K ohm emitter load resistors.

ACCESSORY BOARD: (Refer to Accessory Board Schematic C501-053439)VIBRATO OSCILLATOR

The vibrato oscillator, located on the accessory board, consists of a "Twin T" oscillator circuit (Q5 and Q6) adjusted to produce a 6.4 Hz, 6 volt P-P (peak to peak), vibrato output signal. Vibrato voltage applied to the master oscillator varies the conduction time of Q1, which in turn shifts the oscillator frequency at the 6.4 Hz rate. Resistor R17 is initially selected to set the vibrato oscillator frequency to 6.4 Hz.

Switches located on the tone color, labeled "Light Vibrato" and "Full Vibrato", control the extent of the master oscillator frequency deviation. At Full Vibrato the total frequency deviation is 2.5%.

SOLO AND ACCOMPANIMENT TRIGGER AMPLIFIERS (WIPEOUT CIRCUITS)

Solo and Accompaniment Trigger Amplifier circuits utilize wipeout action and together with the divider circuit provide the bottom seven (7) notes, #18 to #24 of the 16' Solo octave and bottom seven (7) notes, #18 to #24 of the 8' Accompaniment octave, which are monophonic at the above pitches.

Both wipeout circuits are identical so that the following operational description for the Solo circuit also applies for the Accompaniment circuit.

Referring to Switch Schematic D501-053194, the wipeout switch decks consist of seven (7) notes, starting from the bass end of the manual. Input frequencies, Notes #30 through #36, are supplied (crosswired) from the same decks of the Solo or the Accompaniment manual.

When a note in the above range is depressed, signal from the generator is attenuated by a resistor dividing network at the header output point. Attenuation of the signals appearing at the header output point is gradual, so that the signal nearest the bass end of the manual will be of the greatest amplitude. The remainder of the notes toward the treble end of the wipeout range will have gradually lower amplitude.

The Solo header output point is directly coupled to the base of Q1 transistor located on the accessory board. Q1 is biased in such a way that only the extreme peaks will be applied to the Q2 transistor, where it is amplified and applied to the Solo wipeout divider. In this case, if two or more notes in the wipeout range are depressed, only the note closest to the bass end will be detected, amplified by Q2 transistor and applied to the divider.

The Solo wipeout divider is located on the two note generator board #3 (F & F#) and the Accompaniment wipeout divider on the two note generator board #2 (D# & E) assembly.

Wipeout dividers will divide the above input frequency in half which is then applied to appropriate header networks.

CASSETTE REGULATED POWER SUPPLY

Referring to the Accessory Board schematic, a series regulator circuit consisting of Q7, Q8 and Q9 and associated circuit is used to provide the -7 V.D.C. regulated source for the cassette recorder. The output voltage (-7 V.D.C.) is sensed by R27-R28 and applied to Q7, a reference amplifier.

The emitter voltage of Q7 is set by the emitter base junction of Q8 with its base connected to ground, and remains constant. Therefore, any voltage change across R27-R28 will cause Q7 to draw more or less current, varying the conduction of Q9, the series regulating element.

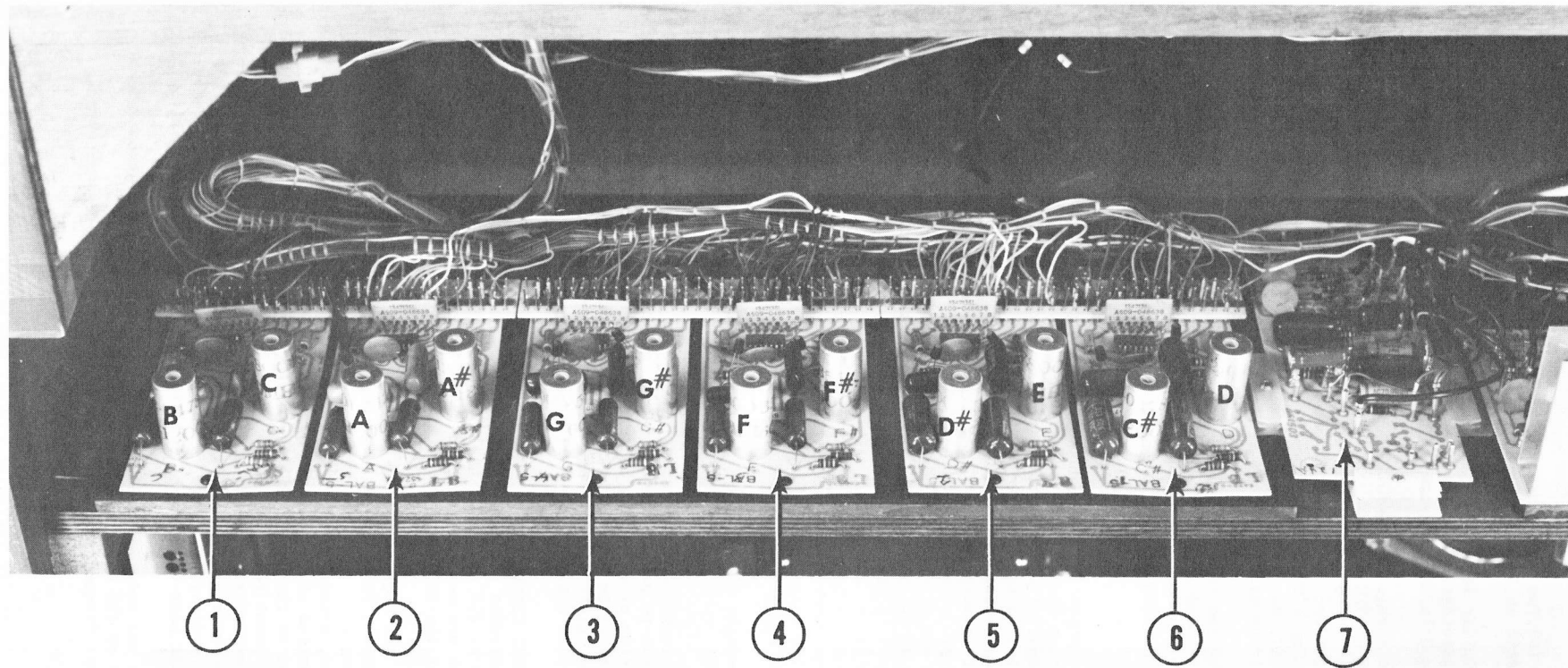


FIG. 6 - GENERATOR SHELF ASSY.

ITEM	DESCRIPTION	PART NUMBER
1	#6 GENERATOR BD. SUBASSEMBLY C - B	X500-048702
2	#5 GENERATOR BD. SUBASSEMBLY A - A#	X500-048701
3	#4 GENERATOR BD. SUBASSEMBLY G - G#	X500-048700
4	#3 GENERATOR BD. SUBASSEMBLY F - F#	X500-048699
5	#2 GENERATOR BD. SUBASSEMBLY D# - E	X500-048698
6	#1 GENERATOR BD. SUBASSEMBLY C# - D	X500-048697
7	ACCESSORY BD. ASSY. 124A ONLY	B500-053858
	124AC, B & BC	B500-053253

RELEASED

Ord. No. FNE95

Date 6-1-71

A) L1 & L2 WERE B512-047800
CN14, B23 CB 2-17-72B) CHANGED WITHOUT
CHANGE NOTICE.

4-10-72

W. R. M.

CAPACITOR VALUE CHART	NOTE	L1		L2	
		S232	S411	S232	S411
BOARD		C4	C3	C2	C1
500-048697	C#			.47	.033
BOARD 1	D	.47	.033		
500-048698	D#			.39	.027
BOARD 2	E	.39	.027		
500-048699	F			.33	.022
BOARD 3	F#	.33	.022		
500-048700	G			.27	.018
BOARD 4	G#	.27	.018		
500-048701	A			.22	.015
BOARD 5	A#	.22	.015		
500-048702	B			.18	.012
BOARD 6	C	.18	.012		

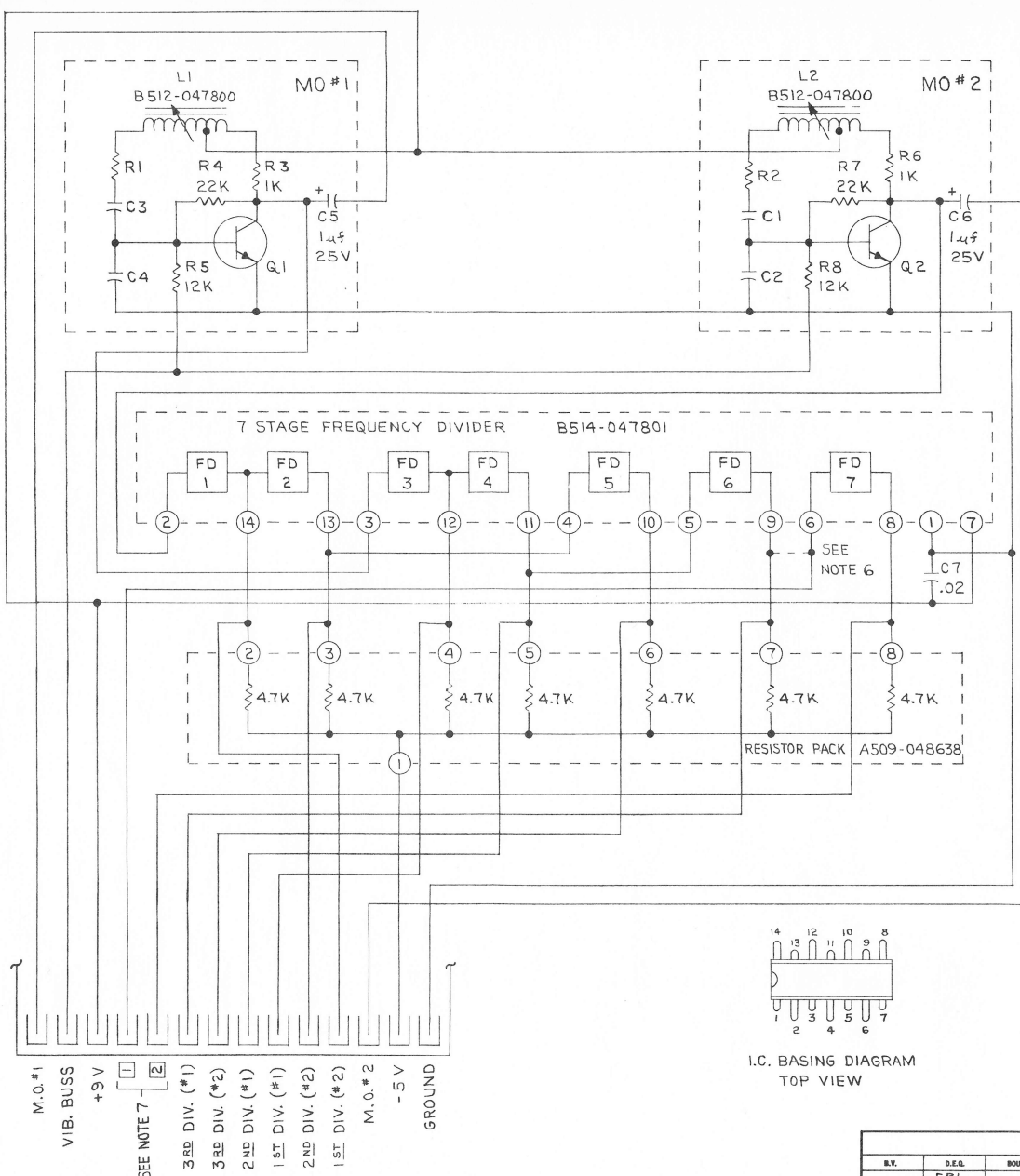
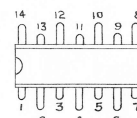
NOTES:

1. ALL RESISTORS ARE $\frac{1}{2}W$ 10% UNLESS OTHERWISE SPECIFIED.
2. ALL VOLTAGES ARE POSITIVE, MEASURED FROM POINTS INDICATED TO GROUND, UNLESS OTHERWISE SPECIFIED.
3. FD ABBREVIATION FOR FREQUENCY DIVIDER.
4. SELECT R1 & R2 FOR $2\frac{1}{2}\%$ VIBRATO WITH 3.3 VOLTS R.P. SELECTING RANGE 0 TO 1K.
5. CIRCLED NUMBERS INDICATE PIN CONN.
6. JUMPER WIRE ON (B & C) 500-048702 SUB-ASSEM. ONLY. (BOARD-6)

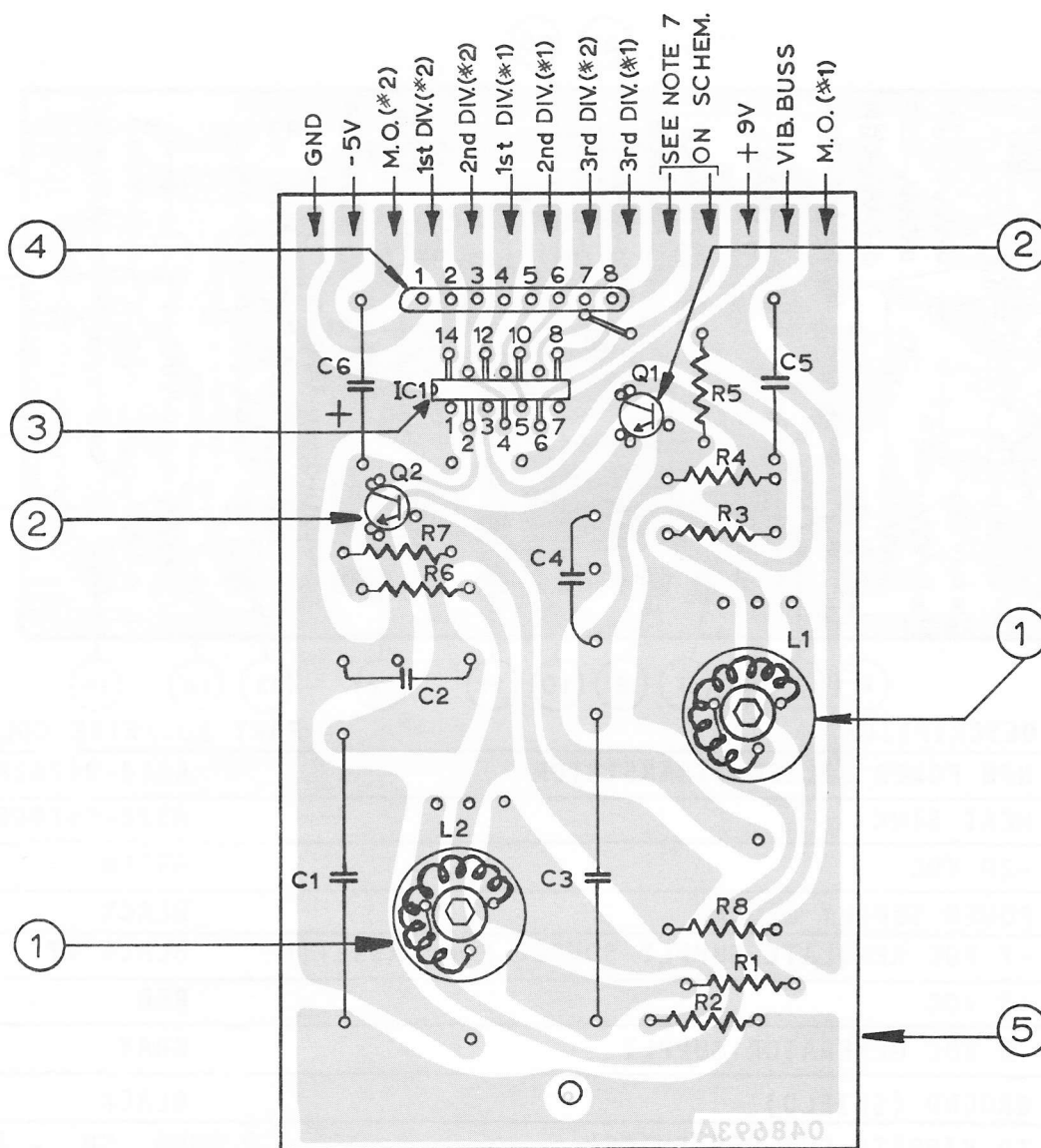
BOARD	CONNECTION
500-048697	① INPUT PEDAL DIV. ② OUTPUT PEDAL DIV.
500-048698	① INPUT 8' W.O. DIV. } ACCOMP. ② OUTPUT 8' W.O. DIV. }
500-048699	① INPUT TO 16' W.O. DIV. } SOLO ② OUTPUT FROM 16' W.O. DIV. }
500-048700	① NO CONN. ② NO CONN.
500-048701	① NO CONN. ② NO CONN.
500-048702	① 4th DIV. INPUT - NO EXT. CONN. ② 4th DIV. (#1)

RECORD OF CHANGE

PRINT DISTRIBUTION				DWN. D. DIEHL		PART NAME SCHEMATIC	
DATE 3-5-71				DATE 3-5-71		2 NOTE GENERATOR BDS.	
CIR. 5BL				CIR. 5BL		B/M 503-125-5 OR. NOTE IT.	
CON. 5BL-1BR				CON. 5BL-1BR		USED ON ORGAN 125-124	
APP. 5BL-1BR				APP. 5BL-1BR		DWN. SCALE NEXT ASSEM.	
FINISH				FINISH		SUPERSEDES	
D. H. BALDWIN CO. CINCINNATI, OHIO				D. H. BALDWIN CO. CINCINNATI, OHIO		C 501-048703 B	

I.C. BASING DIAGRAM
TOP VIEWPARTIAL VIEW OF 2 NOTE GENERATOR BOARD, SHOWING
EDGE CONNECTORS. COMPONENT SIDE SHOWN.

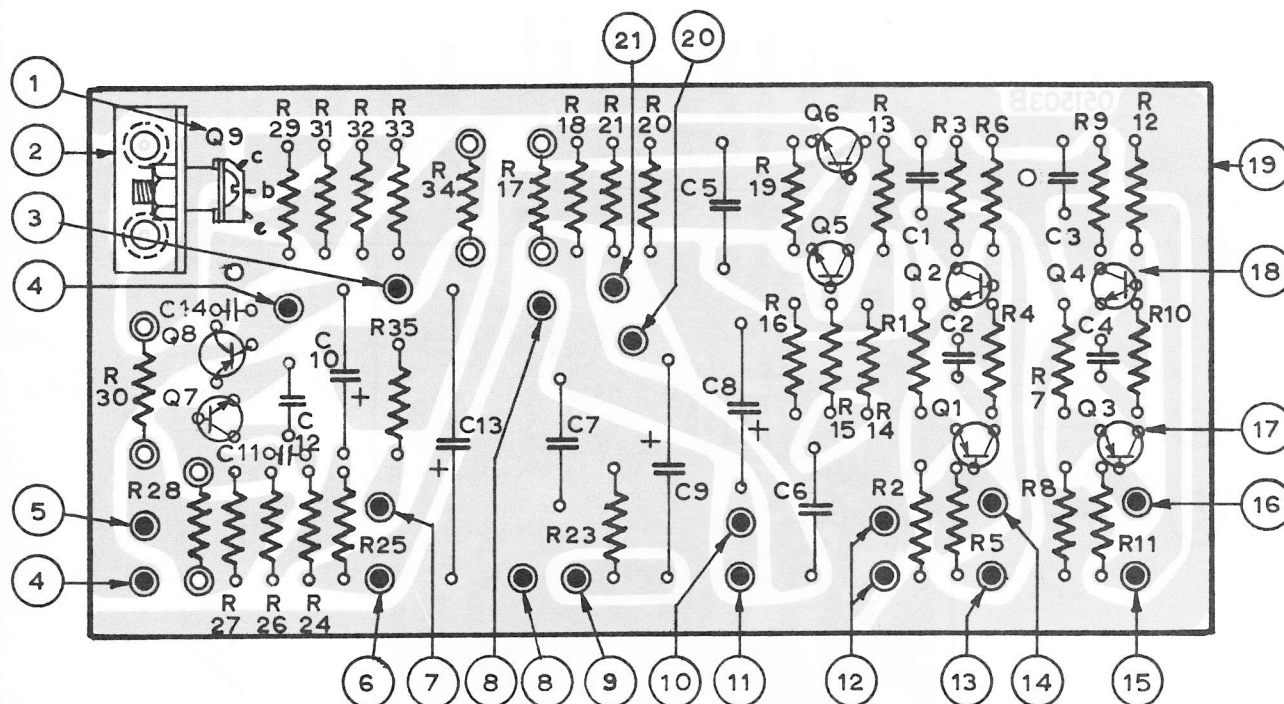
2 NOTE GENERATOR BOARD ASSY (Schematic C501-048703)



ITEM	DESCRIPTION	PART NUMBER
1	VARIABLE INDUCTOR (600mH - 1.2H)	B512-047800
2	SILICON TRANSISTOR NPN	A514-033338
3	FREQUENCY DIVIDER	A514-047801
4	RESISTOR PACK	A509-048638
5	2 NOTE GENERATOR BD. ASSY. C# - D	X500-048697
	D# - E	X500-048698
	F - F#	X500-048699
	G - G#	X500-048700
	A - A#	X500-048701
	B - C	X500-048702

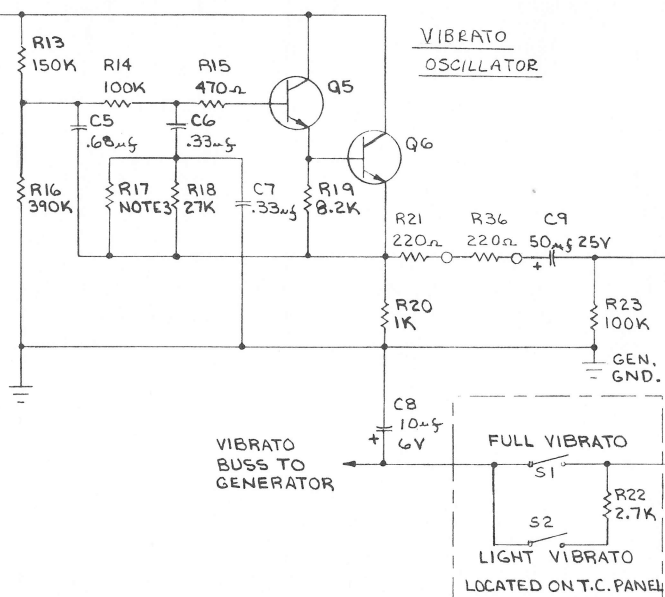
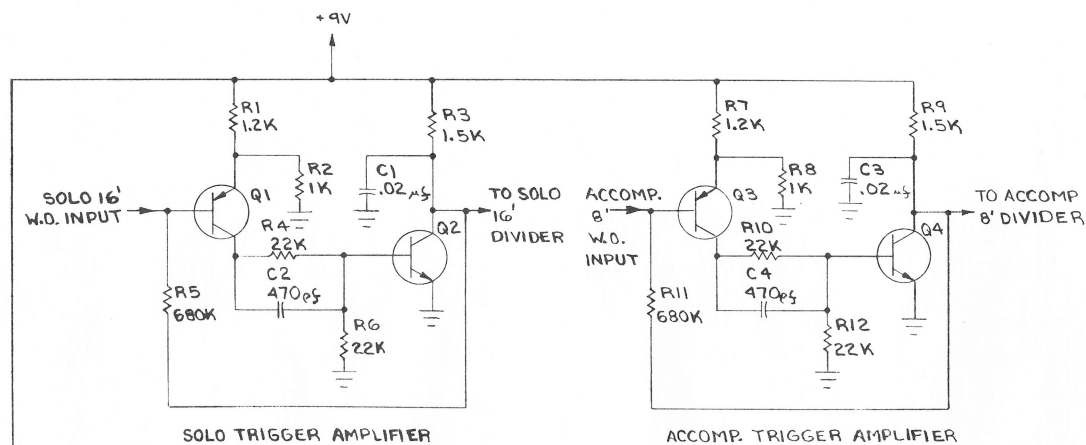
FIGURE 7

ACCESSORY BOARD ASSY. (SCHEMATIC C501-051519)

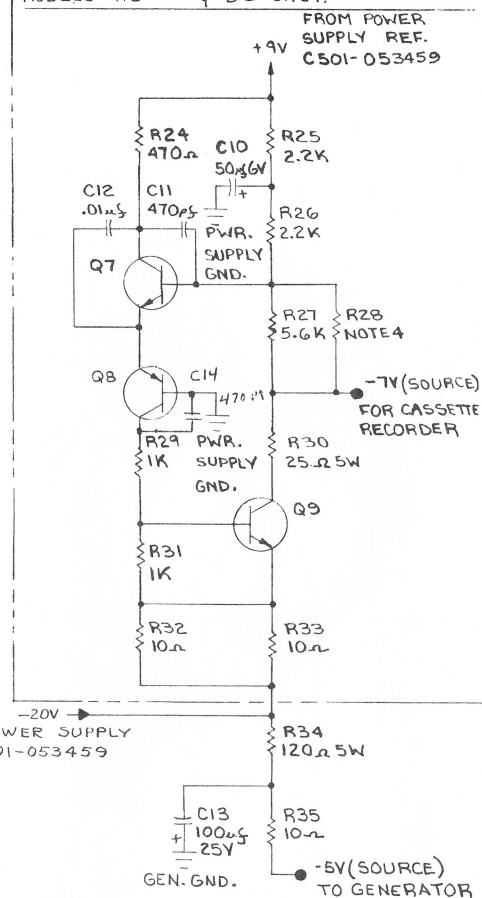


ITEM	DESCRIPTION	PART NO./WIRE COLOR
1	NPN POWER SILICON TRANSISTOR	A514-047828
2	HEAT SINK	A528-051905
3	-20 VDC	GREEN
4	POWER SUPPLY GROUND	BLACK
5	-7 VDC REGULATE SUPPLY SOURCE FOR CASSETTE	BLACK #7
6	+9 VDC	RED
7	-5 VDC GENERATOR SUPPLY	GRAY
8	GROUND (SHIELD)	BLACK
9	TO VIBRATO CUT-OFF SWITCH	2 COND. SH. - BLK
10	VIBRATO BUSS TO GENERATORS	ORANGE
11	FROM VIBRATO CUT-OFF SWITCH	2 COND. SH. - RED
12	GROUND	BLACK
13	TO SOLO 16' W.O. DIVIDER	WHITE
14	SOLO 16' W.O. INPUT FROM KEYSWITCHES	VIOLET
15	TO ACCOMP. 8' W.O. DIVIDER	YELLOW
16	ACCOMP. 8' W.O. INPUT FROM KEYSWITCHES	WHITE
17	PNP SILICON TRANSISTOR	A514-044910
18	NPN SILICON TRANSISTOR	A514-033338
19	ACCESSORY BOARD FINAL ASSY.	B500-051508
20	TO VIBRATO DEPTH POT (HIGH)	2 COND. SH. - RED
21	TO VIBRATO DEPTH POT (WIPER)	2 COND. SH. - BLK

FIGURE 8



THIS PART OF SCHEMATIC PERTAINS TO MODELS AC - & BC ONLY.



NOTES:

1. ALL RESISTORS ARE 1/2W 10% UNLESS OTHERWISE SPECIFIED.
2. D.C. VOLTAGE MEASUREMENTS TAKEN WITH A VOLTMETER (20,000 OHM PER VOLT OR HIGHER) FROM POINT INDICATED TO GND.
3. R17 SELECTED FOR 6.4 HZ VIBRATO FREQUENCY, RANGE 27K TO 82K.
4. R28 SELECTED FOR -7V, SELECTING RANGE 5.6K TO 56K.
5. Q1, Q3, Q8 ARE PNP SILICON (A514-044910)
Q2, Q4, Q5, Q6, & Q7 ARE NPN SILICON (A514-03333B)
Q9 IS NPN POWER (A514-047828).

RELEASED

Ord. No. R.N. 597
Date 8-5-71

A) ENCLOSED PORTION OF CIRCUIT PERTAINING TO MOD. AC-B-BC ONLY C.N. 14679 H.C.R. 10-6-71
B) R36 WAS 820Ω. IS NOW 220Ω C.N. 14739 H.C.R. 1-4-72
C) ADDED C14 PF 470 PF - C.N. 15045 7-25-72
D) REVISE NOTE PERTAINING TO CASSETTE POWER SUPPLY.

RECORD OF CHANGE

PRINT DISTRIBUTION						DATE		PART NAME	
R.V.	D.E.G.	BOUL.	B.B.L.			DATE	7/21/71	ACCESSORY BD. SCHEMATIC	
CHL	GE.	CON.	FAY	B.E.I.	CAH.	DATE	8-5-71	B/W 503-124-5 & NOTE 11	
S			5 BL 1BR			DATE	12-4-72	USED ON 124A AC B & BC	
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UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:						DECIMAL ± .005		ANGLE ± 14°	
FRACTIONAL ± .015									
D. H. BALDWIN CO. CINCINNATI, OHIO						C501-053439		REV.	

LAST COMP NO USED
R C Q S
36 13 9 2

KEYSWITCHING CIRCUIT THEORY

Reference: Switch Wiring Diagram - D501-053194
Model 124 Keyboards - C579-376

The 49 fundamental frequencies produced by the tone generator assembly are carried to the Solo, Accompaniment, and Pedal keyswitches by several cable assemblies. Keyswitch elements are arranged so that tones of various "pitch lengths" can be sounded simultaneously on individual keys. "Pitch lengths" available on the Solo manual are 16' and 8'; on the Accompaniment manual, 8' and 4'; on the Pedal division, 8'. The Pedal signals are gated by a single set of switch contacts which provides trigger to pedal dividers and D.C. control to diode gate circuits covered in Schematic D501-046678.

In order to prevent an "explosive" tonal attack when Solo and Accompaniment keys are played, "controlled attack" keyswitch contacts are employed. These contacts consist of a conductive elastomer header and gold-clad contact wires. The individual generator signal outputs are connected to the contact wires through isolation resistors (Fig. 9). Depressing an organ key causes the contact wire (one of several for that key) to touch and then travel across the header strip. Initially, the small area of contact offers a high resistance to the tone generator signal. Further depression of the key gradually lessens the resistance, giving a "gradual-on" effect as the area of contact between wire and elastomer increases. The isolation resistors are incorporated to eliminate tone generator interaction between pitches simultaneously keyed. In addition, above resistors are utilized to attenuate the signal properly with respect to the bass and treble ends of the keyboard range, thereby, more closely imitating the orchestral effects of the various instruments.

The advantages of this keying system are as follows:

1. Undesirable keying transients are minimized.
2. The sharpness of attack or release is under control of the organist.
3. Independently generated tones are combined with a minimum of source interaction.
4. Signal switching simulates the tonal attack of an organ pipe.

Adjustment of the keyswitch contacts is made by carefully bending the contact wire (just behind the plunger) to obtain proper contact with the elastomer.

KEYSWITCH CLEANING INSTRUCTIONS

Under normal circumstances, the gold clad keyswitch contact wires and silicon elastomer header elements do not require cleaning. In removing foreign matter, use only denatured alcohol as a cleaning agent.

CAUTION: DO NOT USE AEROSOL OR OIL BASE CONTACT CLEANERS.

Keyswitch Boards

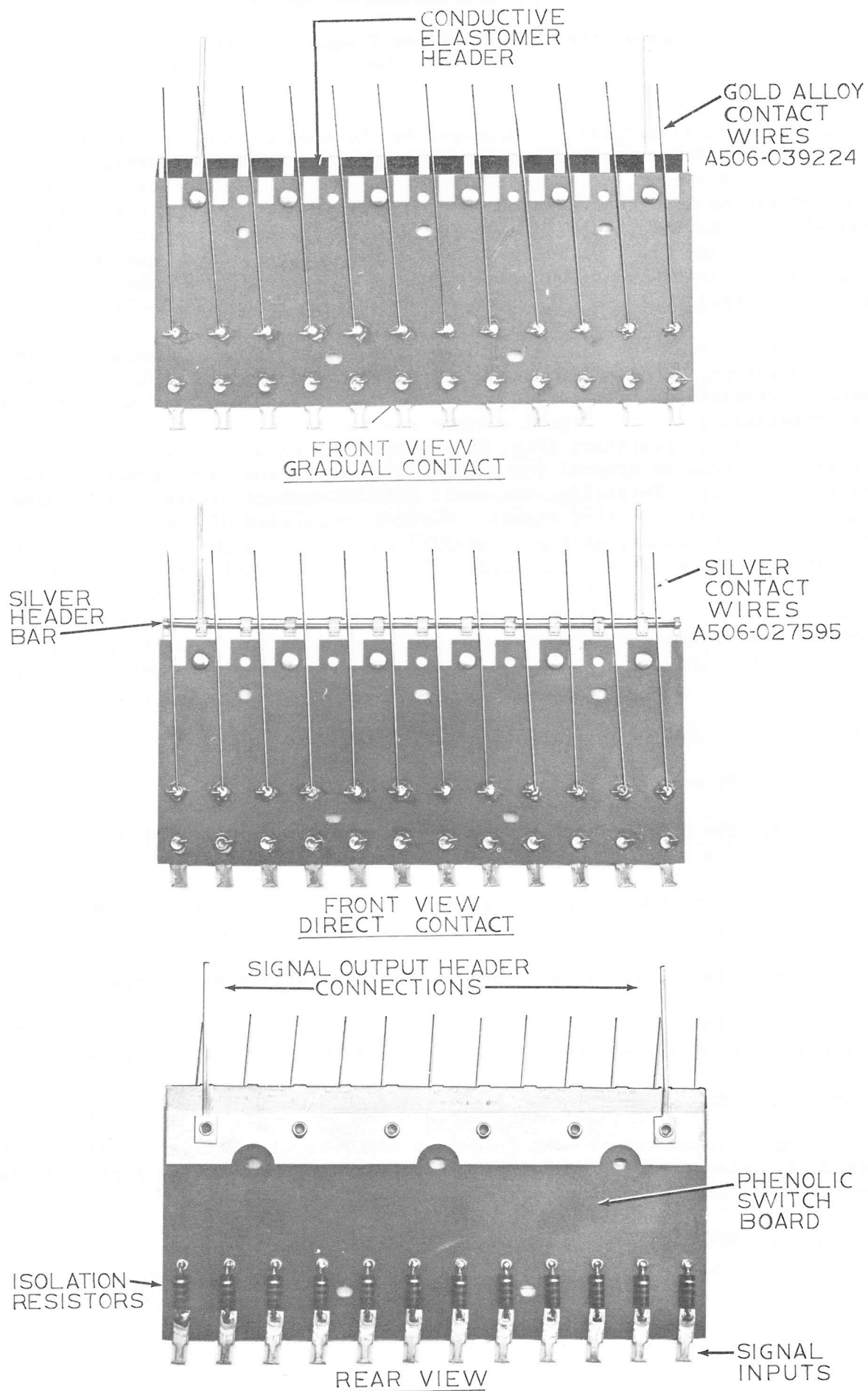
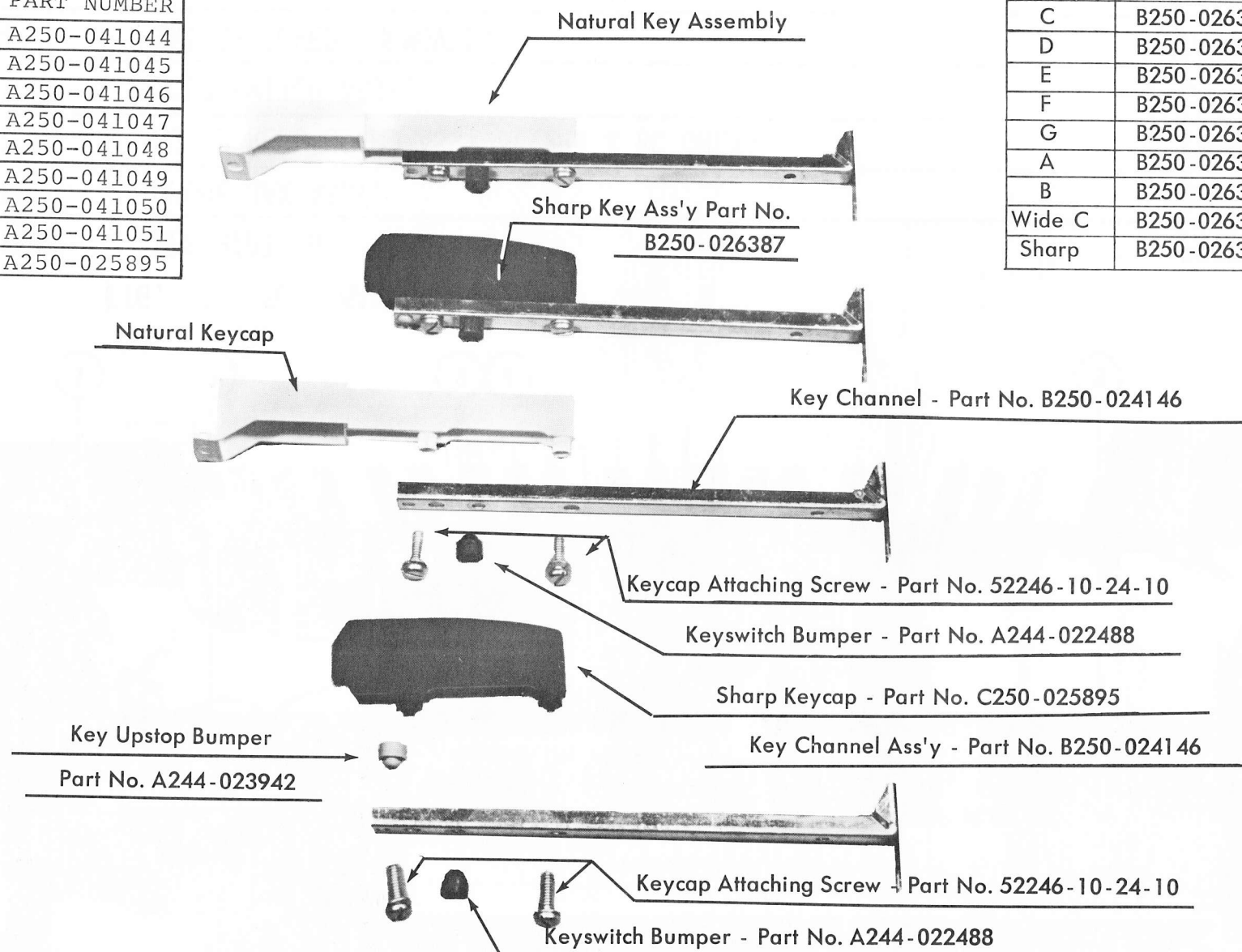


Fig. 9 19

KEYCAPS	
	PART NUMBER
C	A250-041044
D	A250-041045
E	A250-041046
F	A250-041047
G	A250-041048
A	A250-041049
B	A250-041050
Wide C	A250-041051
Sharp	A250-025895

KEY ASSEMBLIES	
	PART NUMBER
C	B250-026379
D	B250-026380
E	B250-026381
F	B250-026382
G	B250-026383
A	B250-026384
B	B250-026385
Wide C	B250-026386
Sharp	B250-026387



KEY ASSEMBLIES

(FIG. 10)

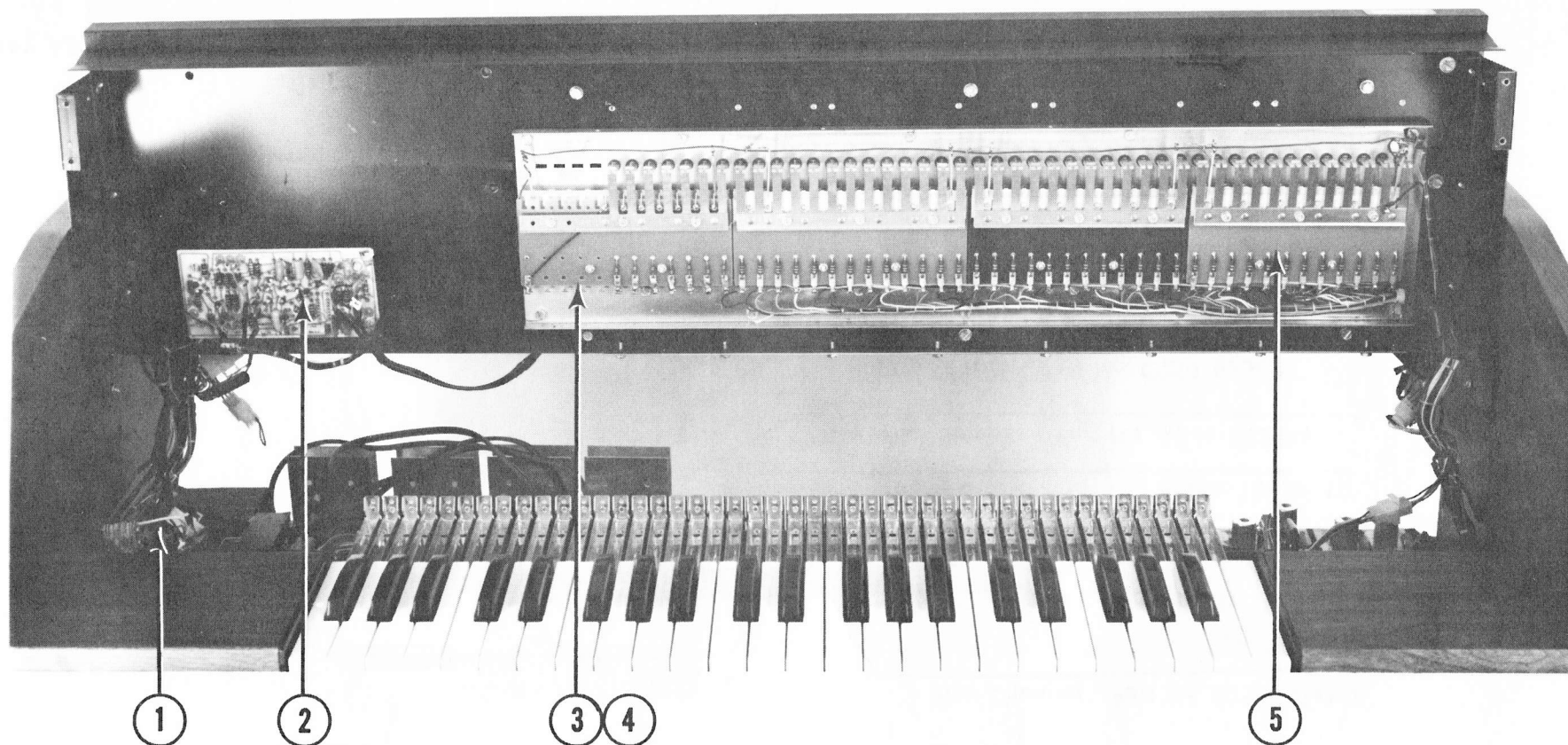
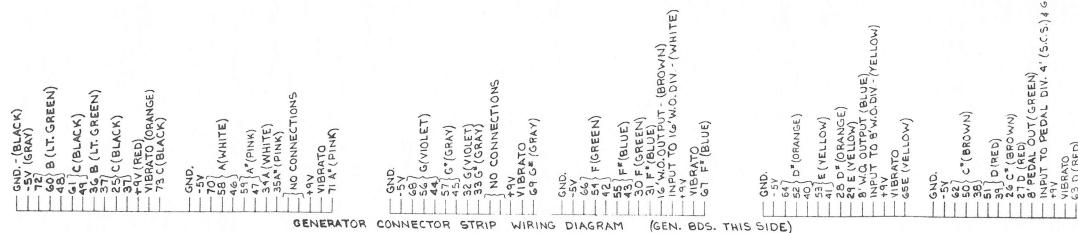
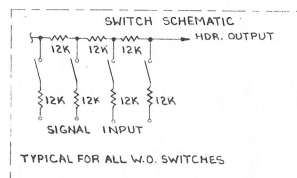
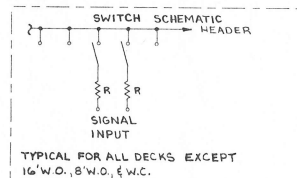
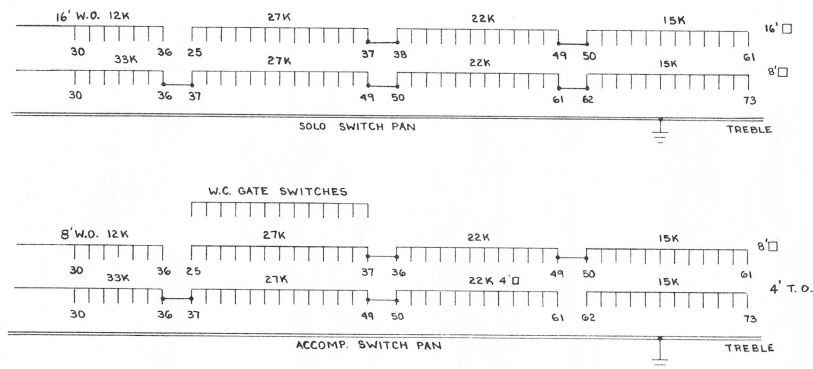


FIG. 11 - SOLO MANUAL RAISED

ITEM	DESCRIPTION	PART NUMBER
1	PHONE JAX ASSY.	B500-053451
2	MUTED REED BOARD ASSY. (124B & BC ONLY)	C500-053966
3	SOLO SWITCH ASSY.	D500-053191
4	SWITCH COVER (REMOVED)	D502-052385
5	12 NOTE SW. BD. ASSY. - TYPICAL	SEE PART LIST



CROSSWIRE: SOLO
1. 30 THRU 49 ON 16' □ TO 30 THRU 49 ON 8' □.
2. 50 THRU 61 ON 8' □ TO 50 THRU 61 ON 16' □
3. BAREWIRE 30 THRU 36 ON 16' □ W.O. TO 30 THRU 36 ON 8' □.

CROSSWIRE: ACCOMPANIMENT
1. 30 THRU 61 ON 4' □ TO 30 THRU 61 ON 8' □.

CABLE CONNECTIONS:

1. GENERATOR SIGNAL CABLE (SOLO) D508-052603.
49 CONNECTIONS - 25 THRU 61 ON 16' □ AND 42 THRU 73 ON 4' B' □ TO GEN. CONN. STRIP.
2. GENERATOR SIGNAL CABLE (ACCOMPANIMENT) D508-052604.
49 CONNECTIONS - 25 THRU 61 ON 8' □ AND 42 THRU 73 ON 4' □ TO GEN. CONN. STRIP.
3. GENERATOR SIGNAL CABLE (PEDAL)
13 CONNECTIONS - 25 THRU 37 ON GEN. CONN. STRIP. (124B & BC ONLY)
4. ACCOMPANIMENT GATE TO WONDER CHORD CABLE
14 CONNECTIONS - TO WONDERCHORD GATE SW. BD.
5. SOLO HEADER CABLE C508-053398 (SEE CHART).
6. ACCOMP. HEADER CABLE C508-053393 (SEE CHART).

SOLO HEADER CONNECTIONS

P 13

4	1
5	2
6	3

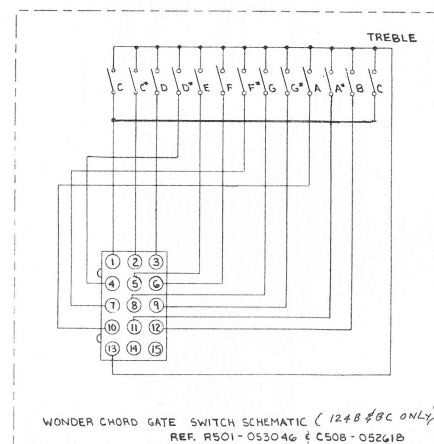
PIN	WIRE	FUNCTION
1	BLUE	16' □
2	BROWN	16' W.O.
3	BLACK #22	GROUND
4		
5		
6	GRAY	8' □

ACCOMP. HEADER CONNECTIONS

P 4

4	1
5	2
6	3

PIN	WIRE	FUNCTION
1	GRAY	8' □
2	BLUE	8' W.O.
3	YELLOW	4' □
4	PINK	4' T.O.
5		
6	BLACK #22	GROUND



COLOR	NOTE	NUMBER
BLACK	C	25 37 49 61 73
BROWN	C*	26 38 50 62
RED	D	27 39 51 63
ORANGE	D*	28 40 52 64
YELLOW	E	29 41 53 65
GREEN	F	30 42 54 66
BLUE	F*	31 43 55 67
VIOLET	G	32 44 56 68
GRAY	G*	33 45 57 69
WHITE	A	34 46 58 70
PINK	A*	35 47 59 71
LT. GREEN	B	36 48 60 72

SK	SAL	WIR	TEST	SAL	WIR
5	5	5	5	5	5

DATE	BY	TEST	DATE	BY
6/18/71	581	6/18/71	581	581

RELEASED

Ord. No. R.N. 597

Date 8-17-71

ADDED INFORMATION PERTAINING TO MODELS 124B & BC ONLY 6-12-72 CN 14,935 WRM


RECORD OF CHANGE


DATE	BY	TEST	DATE	BY
6/18/71	581	6/18/71	581	581

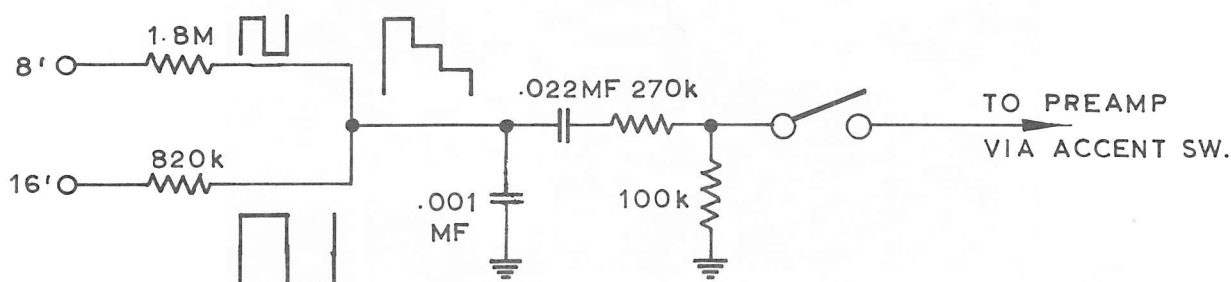
D. H. BALDWIN CO. CHICAGO, ILL. 60601

T O N E C O L O R T H E O R Y

Reference: Schematic - C501-053540 & C501-053181
Drawing - C579-377
Figures - 4, 12, 13 & 23

Signals from the keyswitch headers are conducted to the Tone Color Filter circuits, which modify the generator signals by controlling the harmonic content and format characteristics necessary to produce the various instrumental sounds. Generating system signals are square wave  containing only odd order of harmonics and are well suited for format filters of certain Flute and Reed voices. However, format filters of other organ voices require all harmonics of odd and even order.

A sawtooth  waveform fulfills this requirement and is obtained by adding square wave signals of even harmonics in a correct ratio of magnitude, as shown below for the 16' Cello Filter circuit.



Active filters are used for 8' Flutes and 8' Clarinet. For the rest of the voices low pass and high pass filters are employed. Solo filter outputs are selected by stop tab switches and applied to the appropriate Accent tabs, and then applied to the preamplifier. Stops can be used singly or in any conceivable combination since each stop utilizes an independent filter circuit.

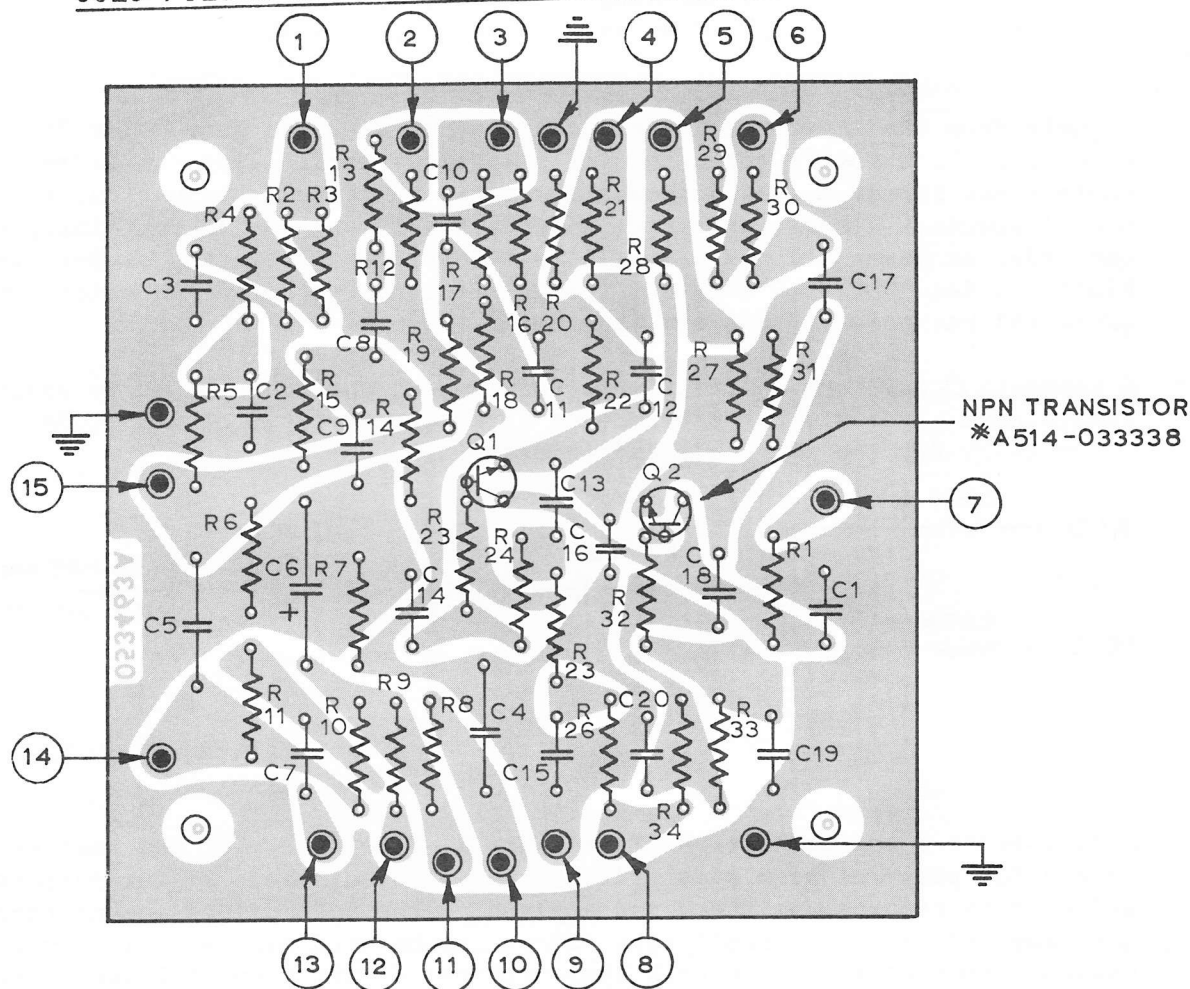
Accompaniment filter outputs are also selected by their stop tab switches and then applied by a common resistor to the input of the preamplifier.

Output from the pedal tab switches (on 124B and BC only) is applied to the Loud-Soft switch, which inserts a resistor in series with the signal when in Soft position. Signal is then applied to the Pedal filter amplifier circuit (Q1) and then to the preamplifier.

Two different pedal filter circuits are used on 124A and 124B models. Bass filter is used on 124A and AC models and is applied to the Pedal Filter amplifier (common for all 124 models) via three (3) pedal tab switches - BASS SOFT, BASS MEDIUM and BASS FULL.

On 124B models STRING BASS filter and LOUD/SOFT tab switches are used. Pedal Sustain feature is also included. For Pedal circuit description refer to the section of the manual for that particular model.

SOLO FILTER BD. ASSY. - B500-053465 (Sch. C501-053540)



ITEM	DESCRIPTION	WIRE COLOR
1	TO 16' FLUTE TAB SW.	ORANGE
2	TO 16' CELLO TAB SW.	BROWN
3	TO 16' SAXOPHONE TAB SW.	GREEN
4	TO 8' FLUTE TAB SW.	YELLOW
5	TO 8' STRING TAB SW.	RED
6	TO 8' CLARINET TAB SW.	BLUE
7	+28VDC	VIOLET
8	+22VDC	ORANGE
9	8' TO MUTED REED BD. ASSY.	SNGL. COND. SH. #8
10	8' <input type="checkbox"/> HEADER INPUT FROM KEYSWITCHES	GRAY
11	"A" KEYSWITCH BUCKING VOLTAGE OUTPUT	RED #1
12	+9VDC	RED
13	16' W.O. INPUT FROM SOLO DIVIDER	BROWN
14	16' <input type="checkbox"/> HEADER INPUT FROM KEYSWITCHES	BLUE
15	16' TO MUTED REED BD. ASSY.	SNGL. COND. SH. #16

FIGURE 12

PREAMPLIFIER AND EXPRESSION CONTROL THEORY

Reference: Preamplifier Schematic - C501-053425

The Model 124 organ employs a single preamplifier circuit, consisting of three (3) NPN transistors.

The signal inputs to the preamplifier are applied through C1 to the base of Q2 transistors, which operates as a voltage amplifier stage. The D.C. condition of the first stage (Ic 50 mA) is set by its base current supplied from the Q3 emitter through R23, R11 and R9 resistors. The collector of the Q2 transistor is directly (D.C.) coupled to the base of the second stage Q3 transistor so that the R10 resistor supplies current for the Q2 collector and Q3 base. The second stage (Q3), operating as an emitter follower, has collector current of about 1.3 mA. A portion of the emitter (A.C.) output, determined by R23 and R24 divider resistors and a variable feedback circuit, is applied back to the base of Q2 as negative feedback controlling the gain of the preamplifier.

The emitter of Q3 is A.C. coupled via C18 capacitor to the base of the last stage Q4, operating as a voltage amplifier. Base current for Q4 is supplied by resistor R30, which sets the collector current to about 2.5 mA.

Output from the preamplifier is applied to a single channel reverb amplifier circuit. Its operation is described under Reverberation System Theory.

Using the VTVM or voltmeter (20,000 Ohms/Volts), D.C. voltages given in the following chart should be measured with respect to ground.

	EMITTER	BASE	COLLECTOR
Q2	0V	+0.6V	+2.8V
Q3	+2.2V	+2.8V	+12V
Q4	0V	+0.6V	+11.8V

Supply voltages are +28V for 3rd (Q4) stage and +22V for 1st and 2nd (Q2 and Q3) stages.

The Rhythm Eliminator circuit, located on the Tone Color preamplifier board, initially grounds the Rhythm output and prevents the Rhythm voices from feeding to the preamplifier until the Rhythm circuits are stabilized. Otherwise, the Rhythm circuits will be gated by voltage transients created when the organ is turned on. When the organ is first turned on, Q1 transistor will be turned on by the charging action of C3 capacitor, thus clamping the Rhythm input point to ground. As capacitor C3 charges, base bias is available for Q1 transistor. With C3 fully charged, Q1 cuts off, permitting the Rhythm signal to be fed to the input of the preamplifier.

EXPRESSION CONTROL CIRCUIT

Referring to Preamplifier Schematic C501-053425, the Expression Pedal circuit consists of a controlling element, Q6, and a double feedback loop around the first two stages of the preamplifier.

When the Expression pedal potentiometer is fully open (up) it back biases transistor Q6 (base at emitter potential). This causes the collector of Q6 (Point 1) to be highly positive with respect to the emitter potential (Point 2).

Referring to the preamplifier feedback circuitry, when Point 1 is highly positive with respect to Point 2, current will flow through R12, D1 and D2 (common anode connection); D3 and D4 (common cathode connection), through R14 to Point 2.

Both pairs of feedback diodes will be forward biased, thus lowering the gain of the preamplifier.

When the expression pedal is fully depressed (down), positive potential is applied to the base of Q6, which will saturate. This causes Point 1 and Point 2 to be at approximately the same potential, causing the feedback diodes to be non-conductive and rendering the preamplifiers in the high gain state.

The Expression pedal also provides the control voltage for the Solo Muted Reed circuit.

PREAMP. BOARD ASSY. C500-053421
(Schematic C501-053425)

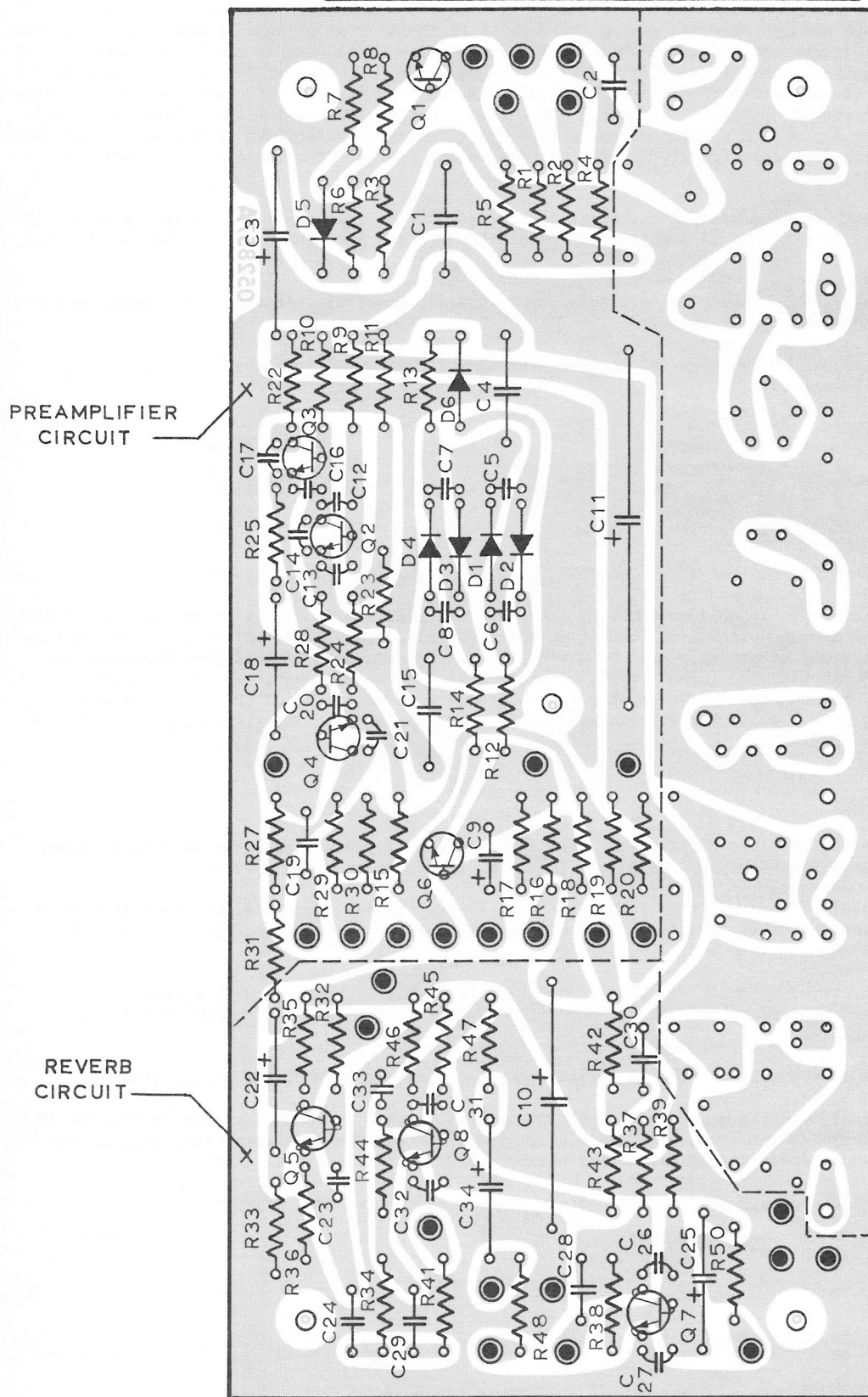
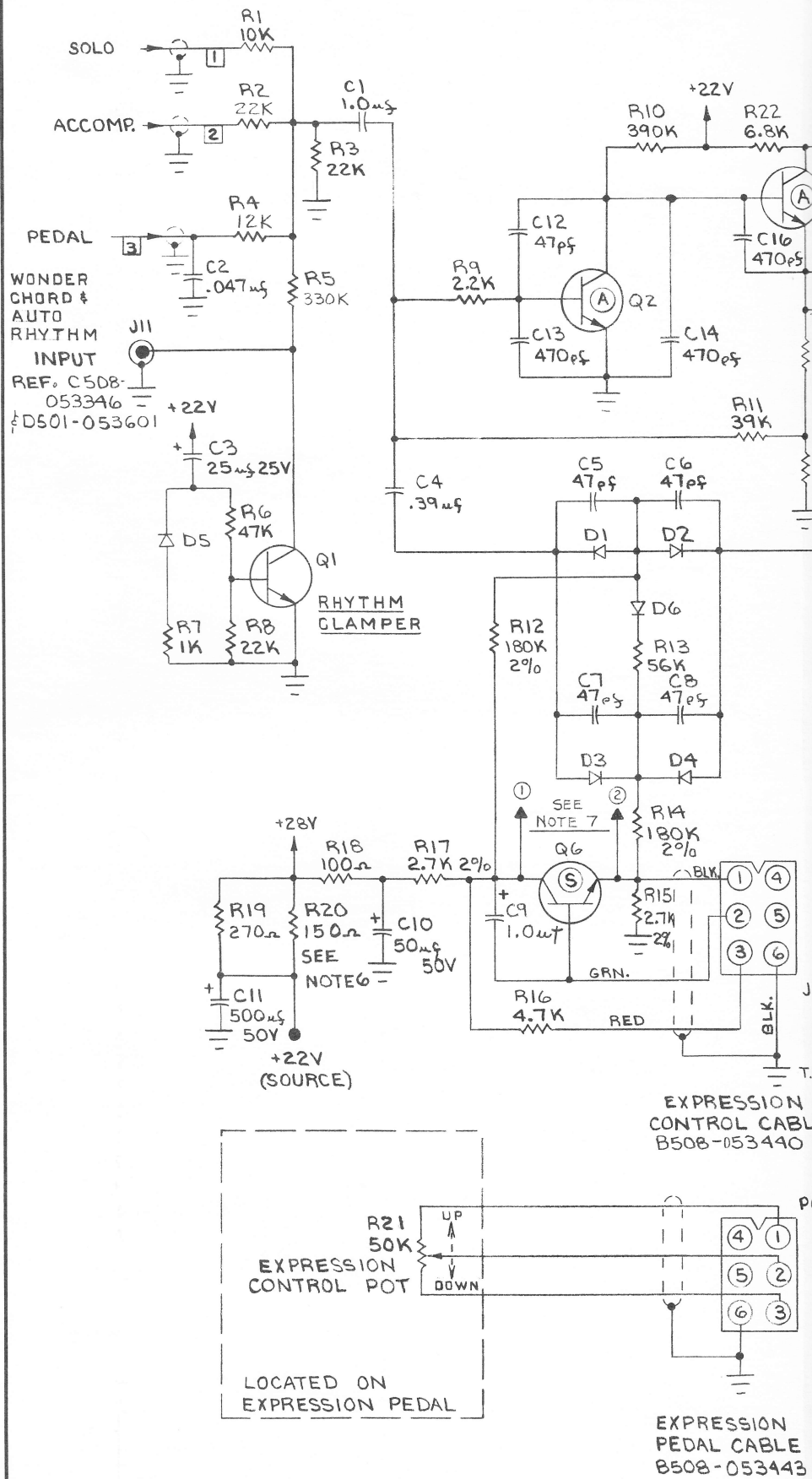


FIGURE 13



Date 8-20-71

A) R5 WAS 33 K

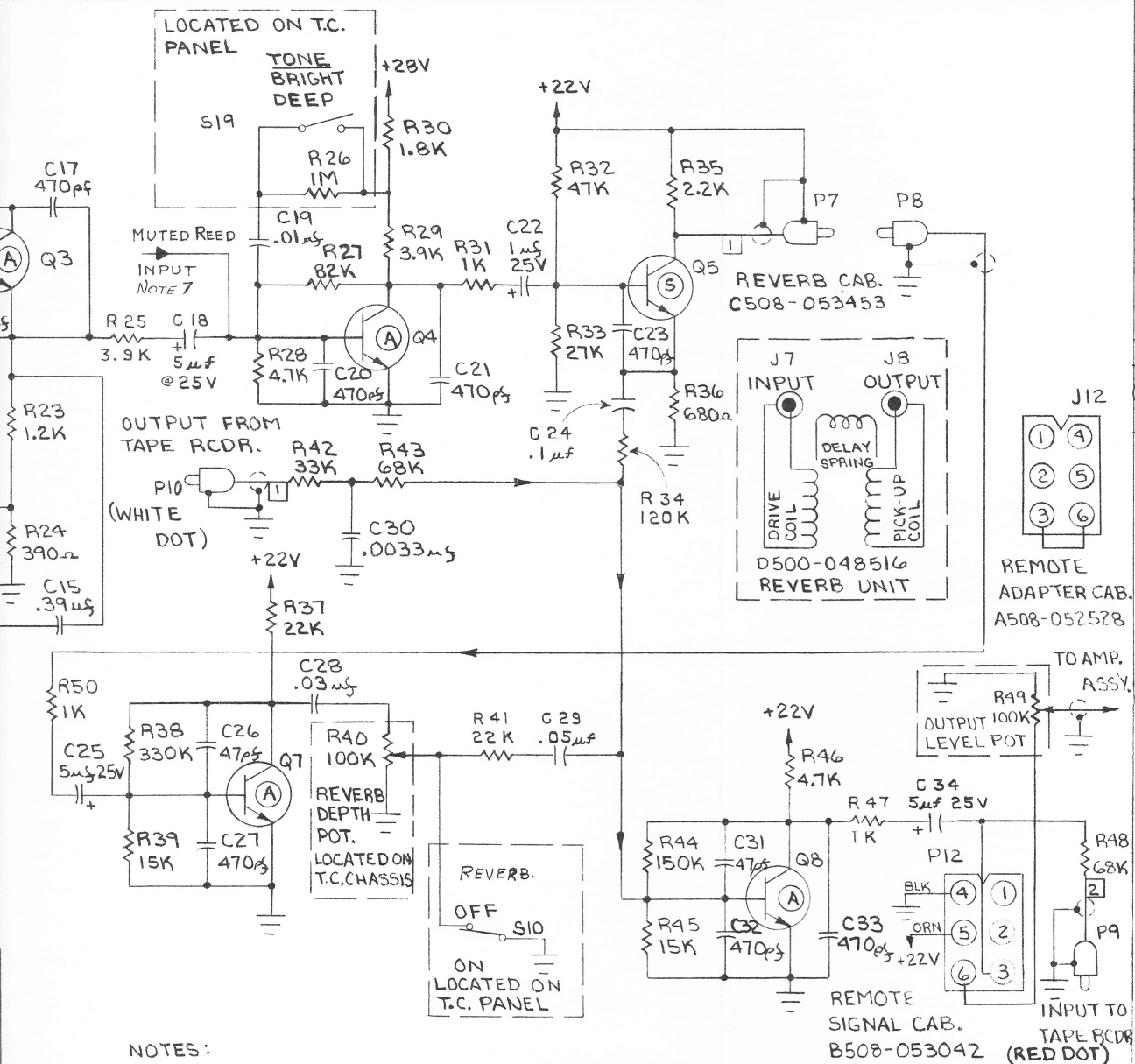
CN 14,654 9-23-71 G.E.

B) ADDED MUTED REED
INPUT & OUTPUT TO
MUTED REED. (NOTE 7)
C.N. 14680 H.E.R. 10-19-71

C) R4 WAS 33K (Now 12K)
R5 WAS 100K (Now 330K)
CHANGED Q5 SELECT. FROM
(A) TO (S)
CN 14,739 HCR 1-5-72

D) C9 WAS. 1 wt
CN 14,772 DP 1-7-72

CHANGED WITHOUT
CHANGE NOTICE.
4-11-72 W.R.M.

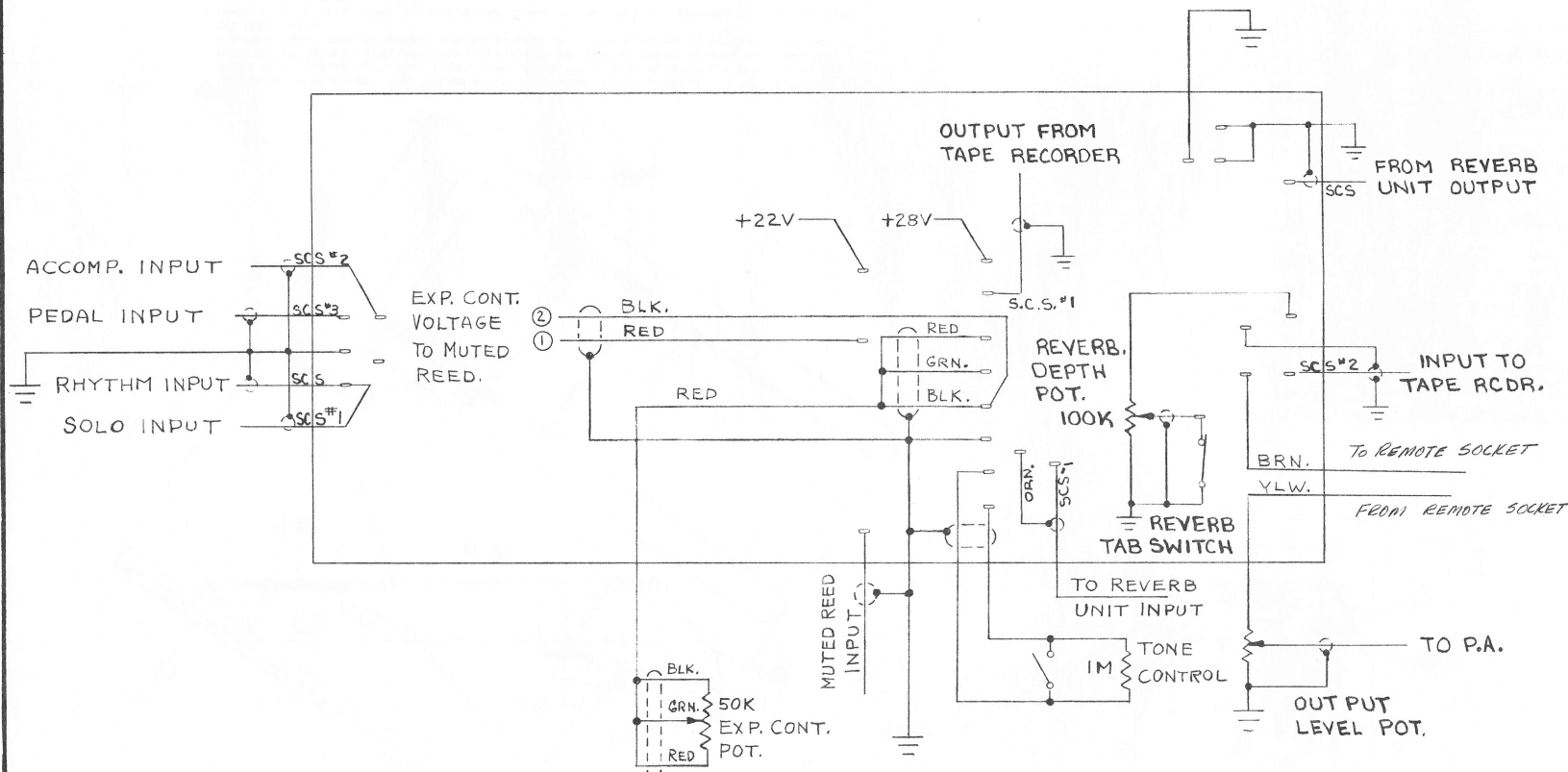


NOTES:

1. N.P.N. TRANSISTORS (A514-033338) ARE SELECTED PER S429- AS INDICATED.
2. D.C. VOLTAGE MEASUREMENTS TAKEN WITH A VOLTMETER (20,000 OHM/VOLT OR HIGHER) FROM POINT INDICATED TO GROUND.
3. ALL RESISTORS ARE $\frac{1}{2}W$, 10% UNLESS OTHERWISE SPECIFIED.
4. BRIDGE DIODES (D1,D2,D3,D4) SELECTED PER S440-1.
5. REFERENCE D.C. POWER & SIGNAL CABLE D508-053428
 - +22V - ORANGE (SOURCE) +53V - WHITE
 - +28V - VIOLET +9V - RED
 - T.C. GND - BLACK #18 PREAMP SIGNAL OUT - S.C.S.
6. R19 (270 Ω) IS REMOVED ON 124A MODEL ORGANS.
R20 (150 Ω) IS REMOVED ON 124B MODEL ORGANS.
7. TO MUTED REED B'D. REF. D501-053950.

RECORD OF CHANGE

PRINT DISTRIBUTION						DWN. C. BELFORD	PART NAME	
B.V.	D.E.Q.	BOULD.	B.S.L.			DATE 8-2-71	T.C. SCHEMATIC - PREAMP	
	5BL					CH'D. NMS	B/S 503-1249 OR. NOTE IT.	
CH.	GR.	CON.	FAY	B.E.I.	CAN.	APP'D. Eak	USED ON 124 ALL SERIES	
S			5BL 1BR			APP'D. [initials]	DWN. SCALE NEXT ASSEM.	
ALL DRAWINGS AND SPECIFICATIONS ARE AND REMAIN THE PROPERTY OF THE D. H. BALDWIN COMPANY AND MUST BE RETURNED TO IT. ALL SPECIFICATIONS ARE CONFIDENTIAL AND ARE NOT TO BE DISCLOSED TO ANY PERSONS OTHER THAN THOSE TO WHOM THEY ARE SENT. NO DRAWINGS, SPECIFICATIONS OR OTHER DATA BELONGING TO THE D. H. BALDWIN COMPANY WHICH MAY BE FURNISHED TO MANUFACTURERS OR OTHERS FOR ANY PURPOSE ARE TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.						FINISH [initials]	REQ. 1	SUPERSEDES
						D. H. BALDWIN CO. CINCINNATI, OHIO		C
UNLESS OTHERWISE SPECIFIED		DECIMAL ± .005		ANGLE ± 1/2°				
TOLERANCES ARE:		FRACTIONAL ± .015						



RELEASED

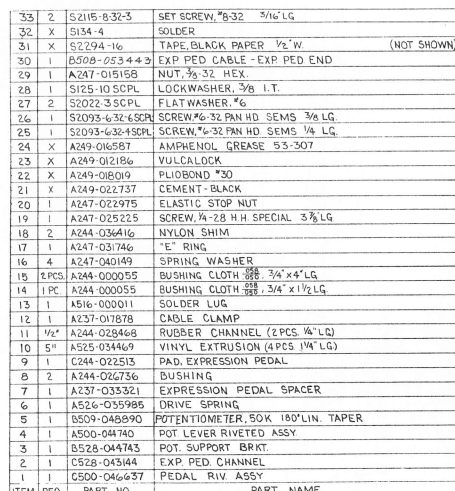
Ord. No. RN597
Date 8-20-71

A/ PIN CALL OUTS REVISED
TO INCLUDE MUTED
REED INPUT & CONTROLS.
C.N. 14680 H.C.R. 10-18-71

B/ REVISED TERMINALS.
SEE REVISED. B505-053426
C.N. 15207 3-1-73 R.M.

RECORD OF CHANGE

PRINT DISTRIBUTION						DWN. C. BELFORD		PART NAME			
B.V.	P.E.Q.	BOULD.		B.B.L.		DATE	7/15/71	PREAMP BD.-PIN WIR. DIA.			
CIN.	GR.	CON.	FAY	B.E.I.	CAH.	CH'D.	<i>LMS</i>	S/M	503-124-19 OR NOTE IT.		
S			5BL 1BR			APP'D.	<i>Rak</i>	USED ON	124 ALL SERIES		
<small>ALL DRAWINGS AND SPECIFICATIONS ARE AND REMAIN THE PROPERTY OF THE D. H. BALDWIN COMPANY AND MUST BE RETURNED TO IT. ALL SPECIFICATIONS ARE CONFIDENTIAL AND ARE NOT TO BE DISCLOSED TO ANY PERSONS OTHER THAN THOSE TO WHOM THEY ARE SENT. NO DRAWINGS, SPECIFICATIONS OR OTHER DATA BELONGING TO THE D. H. BALDWIN COMPANY WHICH MAY BE FURNISHED TO MANUFACTURERS OR OTHERS FOR ANY PURPOSE ARE TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.</small>						APP'D.	<i>W</i>	DWN. SCALE	FULL		
						FINISH	~	REL.	1	NEXT ASSEM.	
										SUPERSIDES	
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:						DECIMAL $\pm .005$ FRACTIONAL $\pm .015$		ANGLE $\pm 1/2^\circ$			
D. H. BALDWIN CO. CINCINNATI, OHIO						B		501-053426			
								REV.			



1. ADJUSTMENT SPECIFICATION--ADJUST THE POSITION OF POT SUPPORT BRKT. (IT.3) SO THAT THE POT LEVER (IT.4) STOPS ON THE BUSHING CLOTH (IT.14) IN BOTH EXTREMES OF TRAVEL, WITH THE SHOE FULLY UP. ROTATE THE POT SHAFT SO THAT 50 TO 100 OHMS RESISTANCE IS MEASURED BETWEEN THE CENTER TERMINAL AND TERMINAL "A" RESISTANCE. SHOULD BEGIN TO INCREASE IMMEDIATELY WITH ANY DOWNWARD MOTION OF THE SHOE, TIGHTEN THE SET SCREWS (IT.33).
2. APPLY VULCLOCK (IT.23) TO PAD (IT.9) AND LET DRY 30 MIN. TO 24 HRS. PRIOR TO CEMENTING TO PEDAL WITH BLACK ADHESIVE (IT.21) OR PLOIBOND (IT.22).
3. EXPRESSION PEDAL BUSHINGS (IT.8) ARE TO BE COVERED WITH AMPHENOL GREASE (IT.24) ON ALL BEARING SURFACES PRIOR TO ASSEMBLY.
4. ADJUST FOR DOWN PRESSURE OF 400 GRAMS.

[illegible]

R E V E R B E R A T I O N T H E O R Y

Reference: Preamplifier Schematic - C501-053425
Figures - 14 & 19

The 124 organ utilizes a single channel reverberation system which is physically located on the treble side of the console (Fig.19). The reverberation system consists of an electro-mechanical delay unit and a transistorized amplifier-driver circuit. The reverberation amplifier is inserted between the output of the preamplifier and the input of the power amplifier. The delay unit, consisting of input driver transducer, delay springs and output transducer, operate between the first and second stage of the reverb amplifier, producing a reverberated effect to the signal, thereby giving "concert-hall" sound in acoustically dead rooms.

Output signal from the preamplifier is applied via C22 capacitor to the base of Q5 transistor which operates as voltage amplifier and emitter follower. As a voltage amplifier, Q5 transistor drives input (driver) transducer from its collector, which causes mechanical motions of the delay line springs. Vibrations travel toward the output transducer, where they are picked up and, as an A.C. signal, applied to the base circuit of Q7 transistor. Transistor Q7, operating as a voltage amplifier, amplifies the received delayed signal and applies it, from its collector, via C28 capacitor, to the level set control (R40).

Referring back, transistor Q5, operating as an emitter follower, applies the non-reverberated signal from its emitter via R34 and C24 to the base of Q8 transistor.

When the Reverb switch is actuated (Reverb On), reverberated signal from the wiper of R40, via R41 and C29, is combined with the non-reverberated signal and amplified by the voltage amplifier Q8 transistor before being applied to the power amplifier level control potentiometer R49. Level of the reverberated signal is adjusted by R40 pot to be in proportion to the non-reverberated signal.

In normally "Off" position (Reverb Off), the reverb switch will supply a ground via its contacts to the wiper of R40 pot, grounding the reverberated signal so that only non-reverberated signal will be applied to Q8 and heard.

Both signals, reverberated and non-reverberated, applied to the base of Q8 transistor are in phase in order to be added up. Transistor Q5 inverts the input signal by its collector circuit for 180° which is later inverted again by the Q7 transistor, totaling to 360° or zero phase, applied to the base of Q8 transistor. Emitter output from Q5 transistor has no phase inversion so that the non-reverberated signal, bypassing second stage Q7, is applied in phase (0° phase) with the reverberated signal at the summing point (base of Q8 transistor).

Reverb circuit transistors, Q5, operate with emitter current of about 10.0 mA, Q7 with collector current of about 400 μ A and Q8 with collector of about 2.8 mA.

Voltages given in the following chart should be measured with the VTVM or high impedance D.C. meter (20,000 Ohms/Volts) with respect to ground.

	EMITTER	BASE	COLLECTOR
Q5	+7.0V	+7.6V	+20V
Q7	.0V	+0.6V	+13V
Q8	.0V	+0.6V	+9V

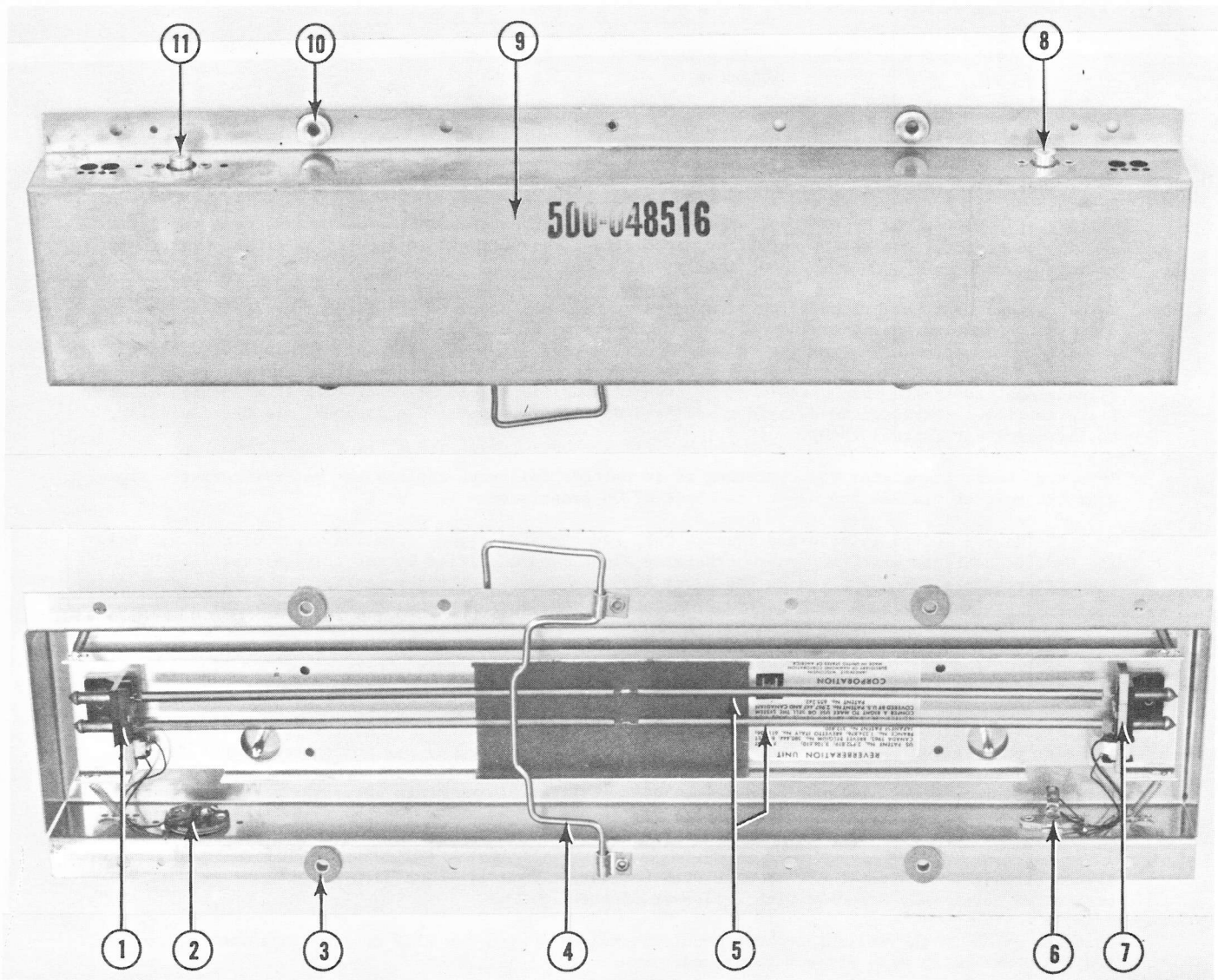
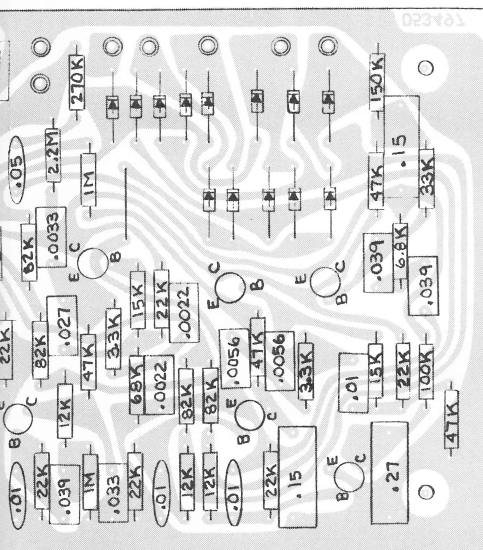


FIG. 14 REVERB UNIT

ITEM	DESCRIPTION	PART NUMBER
1	INPUT (DRIVER)	
2	SINGLE INSULATED PHONO PINJACK - INPUT	
3	GROMMET	A244-023596
4	SPRINGS SHIPPING CLAMP	
5	DELAY SPRINGS	
6	SINGLE GROUNDED PHONO PINJACK - OUTPUT	
7	OUTPUT (PICK-UP)	
8	REVERB OUTPUT	
9	REVERB UNIT	D500-048516
10	BUSHING	A244-010001
11	REVERB INPUT	

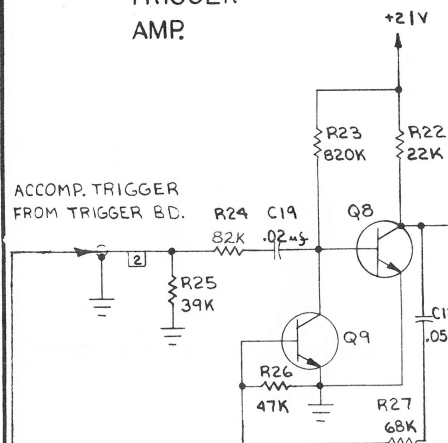
rd. No. CN 14,598
Date 8-6-71



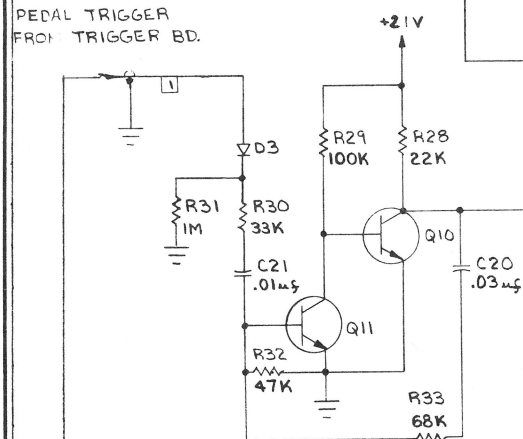
INCLUDE LABEL MARKED 500-053499_.

PRINT DISTRIBUTION				DWG. C. BELFORD		PART NAME			
B.L.L.				DATE 8-5-71		RHYTHM VOICE BD.-ASS'Y.			
FAY		CML		CHD. <i>2745</i>		B/S 503-120-19 or 3 IT.			
3BL 1BR				APP'D. <i>Rel</i>		USED ON 120R & RA, 124A & AC			
REMAIN THE PROPERTY OF THE D. H. BALDWIN COMPANY AND MUST BE RETURNED AND ARE NOT TO BE DISCLOSED TO ANY PERSONS OTHER THAN THOSE TO WHOM ORS OR OTHER DATA BELONGING TO THE D. H. BALDWIN COMPANY WHICH MAY BE FOR ANY PURPOSE ARE TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN OTHER PERSON OR CORPORATION OR CONVEYING ANY RIGHTS OR PERMISSION TO INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.				APP'D.		DWG. SCALE F.S.			
				FINISH		RED. 1		NEXT ASSEMB. 500-053439	
						SUPERSEDES			
DECIMAL ± .005 FRACTIONAL ± .015		ANGLE ± 1/4°		D. H. BALDWIN CO. CINCINNATI, OHIO		C 500-053499 REV.			

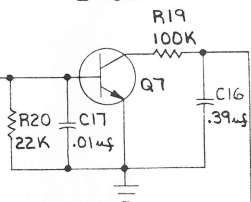
ACCOMP. TRIGGER AMP.



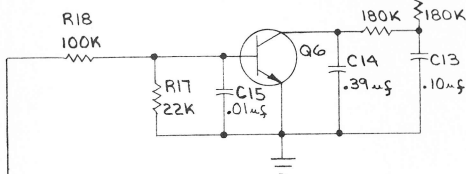
PEDAL TRIGGER FROM TRIGGER BD.



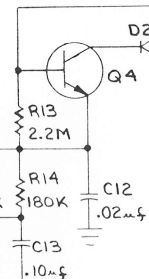
BRUSH



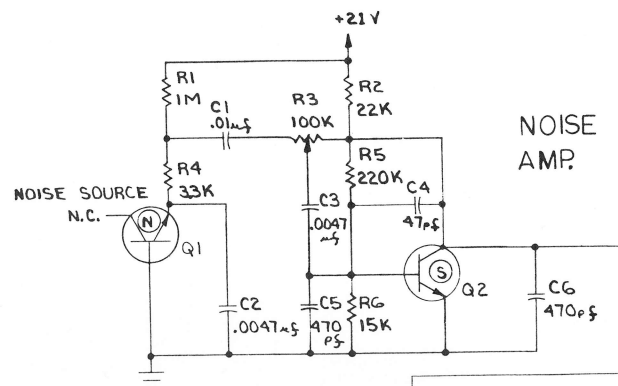
PEDAL TRIGGER AMP.



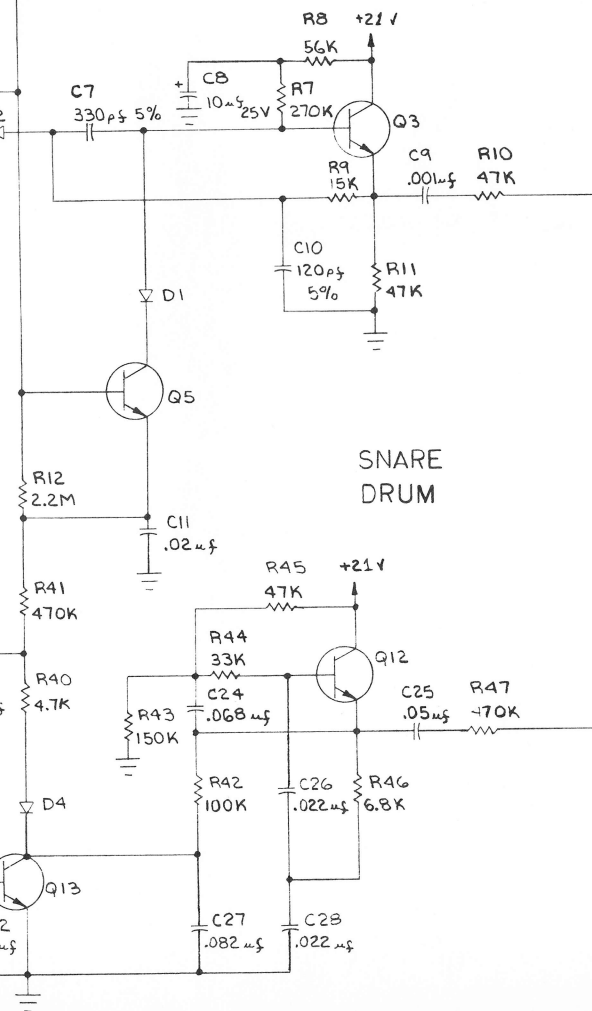
CYMBAL



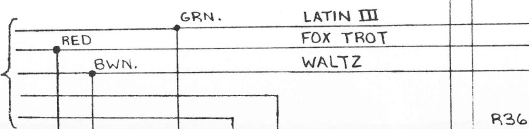
NOISE AMP.

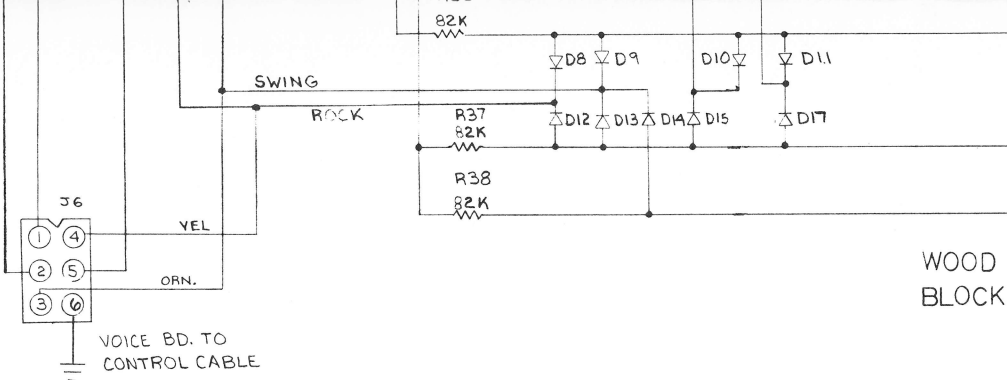


SNARE DRUM



REF. D501
-053187
Rev. "C"





NOTES:

1. ALL RESISTORS ARE $\frac{1}{2}W$ 10% UNLESS OTHERWISE SPECIFIED.
2. SELECT NPN TRANSISTORS PER S429- AS INDICATED.
3. D.C. VOLTAGE MEASUREMENTS TAKEN WITH A VOLTMETER (20,000 OHM/VOLT OR HIGHER) FROM POINT INDICATED TO GROUND

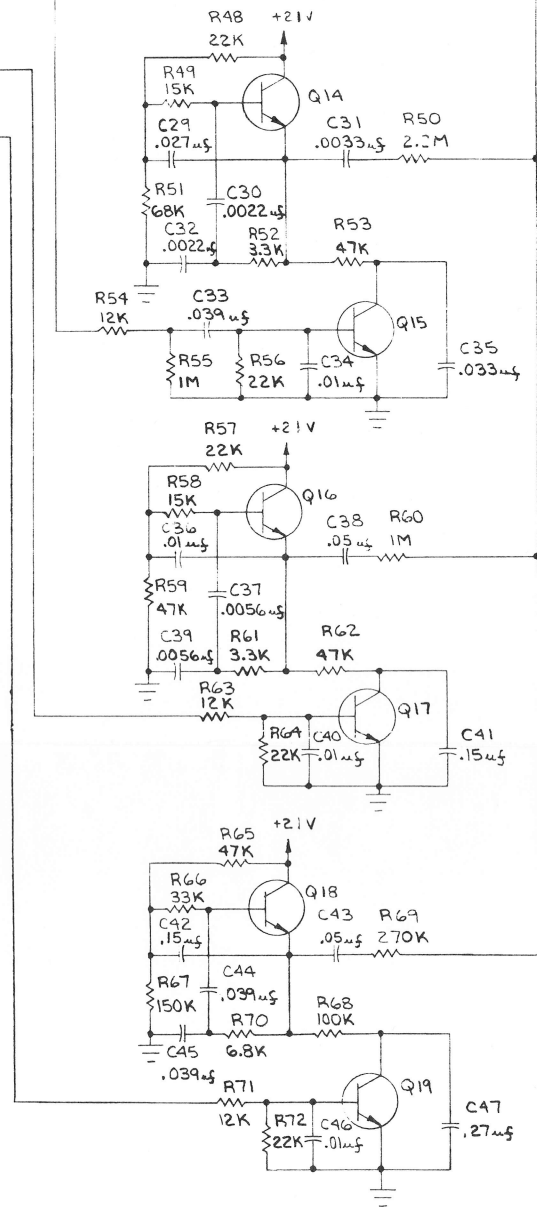
ONE MEASURE (EXCEPT WALTZ)

PATTERN	ONE WALTZ MEASURE			ONE WALTZ MEASURE		
	PULSE: 1	2	3	1	2	3
WALTZ	BRUSH	BRUSH	BRUSH	BRUSH	BRUSH	BRUSH
	CYMBAL			CYMBAL		
	BASS DRUM			BASS DRUM		
	T. LIGHT			T. LIGHT		
FOX TROT	BASS DRUM	BRUSH		BASS DRUM	BRUSH	
	CYMBAL			CYMBAL		
	T. LIGHT			T. LIGHT		
SWING	BRUSH	SNARE		BRUSH	SNARE	
	CYMBAL	CYMBAL		CYMBAL	CYMBAL	
	T. LIGHT			T. LIGHT		
ROCK	BRUSH	SNARE		BRUSH	SNARE	
	CYMBAL			CYMBAL		
	BASS DRUM			BASS DRUM		
	T. LIGHT			T. LIGHT		
LATIN	BRUSH	BRUSH		BRUSH	BRUSH	
	WD. BLOCK	WD. BLOCK		WD. BLOCK	WD. BLOCK	
	CYMBAL			CYMBAL		
	CLAVE			CLAVE		
	BASS DRUM			BASS DRUM		
	T. LIGHT			T. LIGHT		

WOOD BLOCK

CLAVE

BASS DRUM



TO RHYTHM VOLUME POT.

REF. D501-053601

LAST COMP. NO. USED

R	C	Q	D	J	P
72	47	10	17	6	3

RELEASED
 Ord. No. CH 14598
 Date 8-9-71
 A/ADDED CHART FOR
 TECH. SERV. INFORMATION
 NO. C.N. 8-18-71 H.C.R.
 B/DELETED D16
 CN 14744 1-4-72

RECORD OF CHANGES

RHYTHM VOICE SCHEMATIC

DATE 8-6-71

D. H. BALDWIN CO.
 CINCINNATI, OHIO

501-053187

B

RHYTHM PERCUSSION THEORY

Reference: Rhythm Schematic - D501-053187
Drawing - D579-378
Figures - 4 & 15

PURPOSE: The Voice Rhythm unit produces six (6) distinct percussion sound sources for Auto Rhythm circuit on 124A models and WonderChord circuit on 124B models.

The Brush, Wood Block and Snare Drum are triggered from the Accompaniment trigger amplifier. The Bass Drum, Clave and Cymbal are triggered from the Pedal trigger amplifier.

Trigger pulses for the Accompaniment and Pedal trigger amplifiers are supplied by trigger gates from the Auto Rhythm or WonderChord circuit.

GENERAL DESCRIPTION:

All of the voices are gated so that a pulse of tone is generated and applied to the organ preamplifier circuit when a trigger pulse is received.

A volume control is provided to allow the organist to balance the level of the rhythm voices with the organ stops he has selected. Another adjustment control is provided (not a panel control) which sets the level of Brush, Cymbal, and the Snare component of the Snare Drum.

DETAILED DESCRIPTION:

Reference: Schematic D501-053187

All of the percussive tones are generated on the Rhythm Voice board and are not dependent upon any organ frequency or tone. The tones developed for the Wood Block, Tom-Tom, Bass Drum, and Clave are obtained from their respective gated-on oscillators.

The Brush and Cymbal tones are derived from the noise source. The Snare Drum sound is obtained by gating on the Tom-Tom and noise source simultaneously.

Referring to the above schematic, Q8 and Q9 are the Accompaniment trigger amplifier transistors which receive a triggering pulse from the Auto Rhythm or WonderChord Accompaniment Rhythm trigger gates. Q8 is normally in saturation, therefore, its collector is essentially grounded. When a negative pulse is applied to the base of Q8 (NPN), the transistor goes out of saturation. The collector of Q8 rises toward +22 volts. This voltage rise, a positive pulse, is used to trigger the respective Accompaniment rhythm voices. The same positive pulse is applied to the base of Q9 transistor, via C18 and R27. Q9 will saturate for a determined time period. Its collector, now at ground potential, applied to the base of Q8, will prolong the cutoff time of Q8 transistor. The above action assures that the above trigger amplifier output pulse width is not dependent on the width of the input pulse. In such a way, the gated-on oscillator trigger circuits will gate on the oscillator for the same period of duration.

The Pedal Trigger amplifier circuit, consisting of Q10 and Q11, operates in the same way as the previously described Accompaniment trigger amplifier, with the exception that the input pulse is positive and is applied to the base of Q11. Upon reception of the positive pulse Q11 will saturate and Q10 unsaturate, creating a positive pulse at the collector of Q10, which is then applied to the respective rhythm voices.

In order to accomplish a proper rhythm pattern, diodes are programmed in such a way that when any one of the five rhythm switches are depressed, its contacts supply the ground to the specific group of diodes, inhibiting the trigger pulses from the undesired trigger gates.

Accompaniment Brush and Pedal Cymbal trigger gates do not employ programming diodes in their input circuit, allowing them to operate the Brush-Cymbal gate Q4 on every trigger pulse generated by the trigger amplifier circuits.

The gated-on oscillators all have the same theory of operation. The discussion of one circuit, such as the Wood Block, will apply as well to the circuits for the Tom-Tom, Bass Drum, and Clave.

The Wood Block gating transistor Q15 is normally off. The emitter resistor of the Twin-T oscillator (Q14) has no D.C. path, thus the oscillator is disabled. The Twin-T oscillators used to generate the desired frequencies are similar in operation to the Baldwin Vibrato oscillator.

When a positive pulse is applied to gating transistor Q15, the transistor saturates for a period of time determined by the width of the positive gating pulse and external components. The collector of Q15 is thereby grounded. This discharges C35 and grounds the emitter resistor R53 of Q14, which permits the oscillator to function. When Q15 cuts off, the oscillator continues to function while C35 charges.

As C35 approaches full charge, the amplitude of the oscillator is gradually reduced. The decaying envelope of the oscillator frequency is determined by the time constant of R53 and C35.

The approximate frequencies for the Twin-T oscillators are:

Wood Block	950 Hz
Tom-Tom	200 Hz
Clave	2100 Hz
Bass Drum	100 Hz

Each respective oscillator has a level setting resistor such as R40 for the Wood Block circuit.

These level setting resistors balance the rhythm voices with respect to one another.

The Brush and Cymbal voices are obtained by gating on a noise source. The noise source is obtained from transistor noise source circuit Q20, Q21, and Q22 and amplifier Q23. This noise is continuously applied to the base of gating transistors Q4 and Q5.

The Brush and Cymbal trigger gate transistor circuits Q6 and Q7 are identical except for the length of time the voice is sounded. The Cymbal trigger gate sustains for a longer period of time.

When a positive pulse is applied to either the Brush or Cymbal trigger transistors Q7 or Q6, transistor Q4 (Brush-Cymbal gate) is turned on and the noise is applied to the input of the bandpass amplifier Q3. This is a bandpass filter which peaks at approximately 10k Hz. The signal is then taken from the emitter of Q3 and applied to the output buss.

The R19 resistor and C16 capacitor in the collector circuit of the Brush trigger transistor Q7 determine the attack and decay of the Brush noise envelope.

Resistors R14 and R15 and capacitors C14-C13 in the collector circuit of the Cymbal trigger transistor Q6 serve a similar purpose for the Cymbal noise envelope.

The remaining rhythm voice to be discussed is the Snare Drum. The Snare Drum sound is obtained by simultaneously gating on the Tom-Tom voice and Snare Drum gate Q5. A positive pulse applied to the Snare trigger transistor Q13 will gate both the Tom-Tom oscillator Q12 and Snare Brush gate Q5. Gate Q5 will turn on, applying the noise source to the bandpass amplifier. Also, the Tom-Tom oscillator Q12 will produce the output which together with the Brush output will create the Snare Drum sound.

Rhythm Percussion Theory
Detailed Description
(Cont'd.)

The noise level set control, R83, is adjusted to give the most authentic Snare Drum sound. Once this control has been set, the level of the Brush and Cymbal cannot be changed without destroying the authenticity of the Snare Drum voice.

The outputs of the various voices are summed in the volume control, R69, and fed to the input of the preamplifier through the Rhythm Eliminator circuit.

The Rhythm Eliminator, or clamping circuit Q1, located on the preamplifier board assembly, delays the Rhythm Percussion input to the preamplifier circuit. This action is described under the Preamplifier and Expression Control paragraph.

RHYTHM VOICE BOARD ASSY. C500-053499

Schematic D501-053187

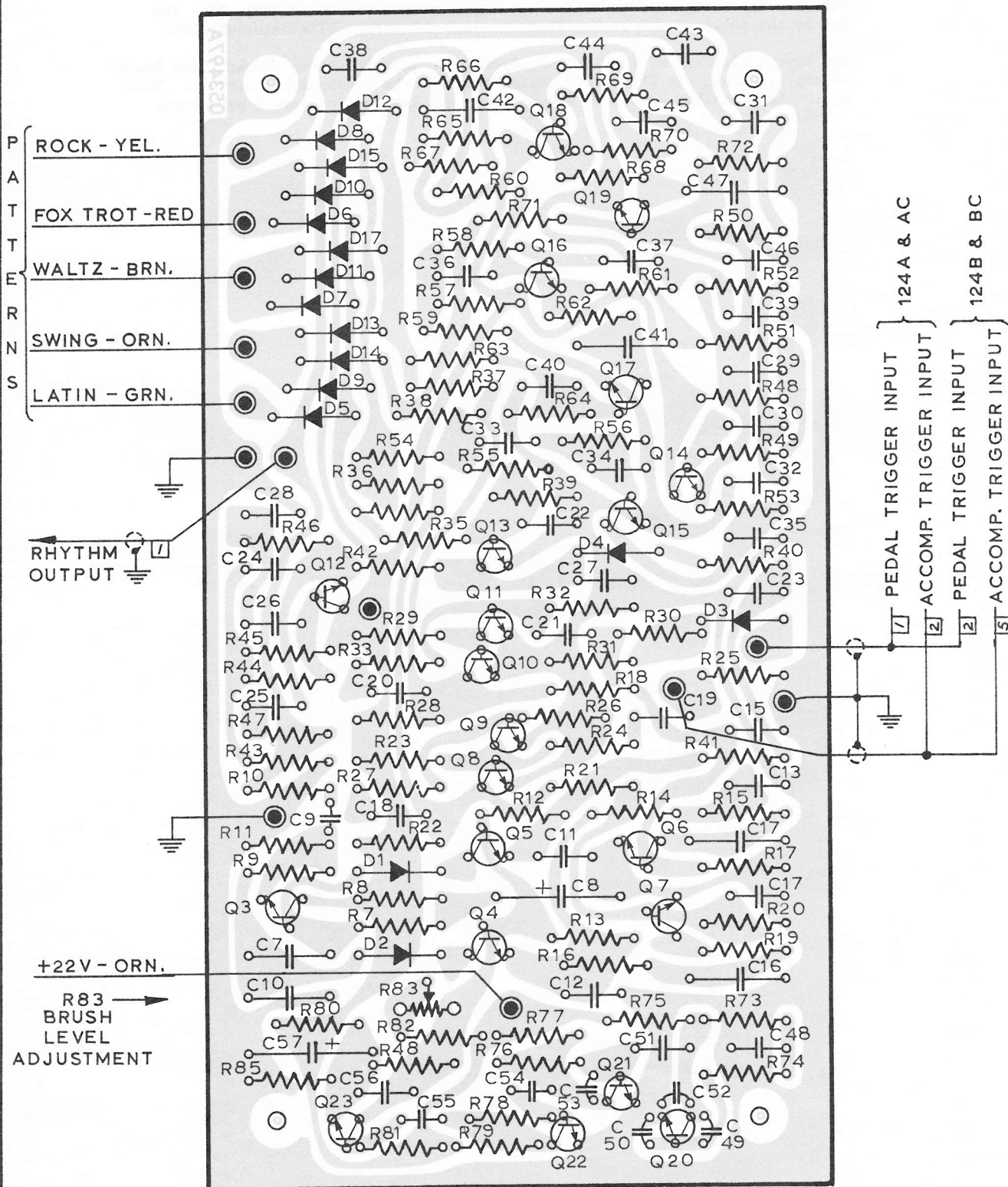
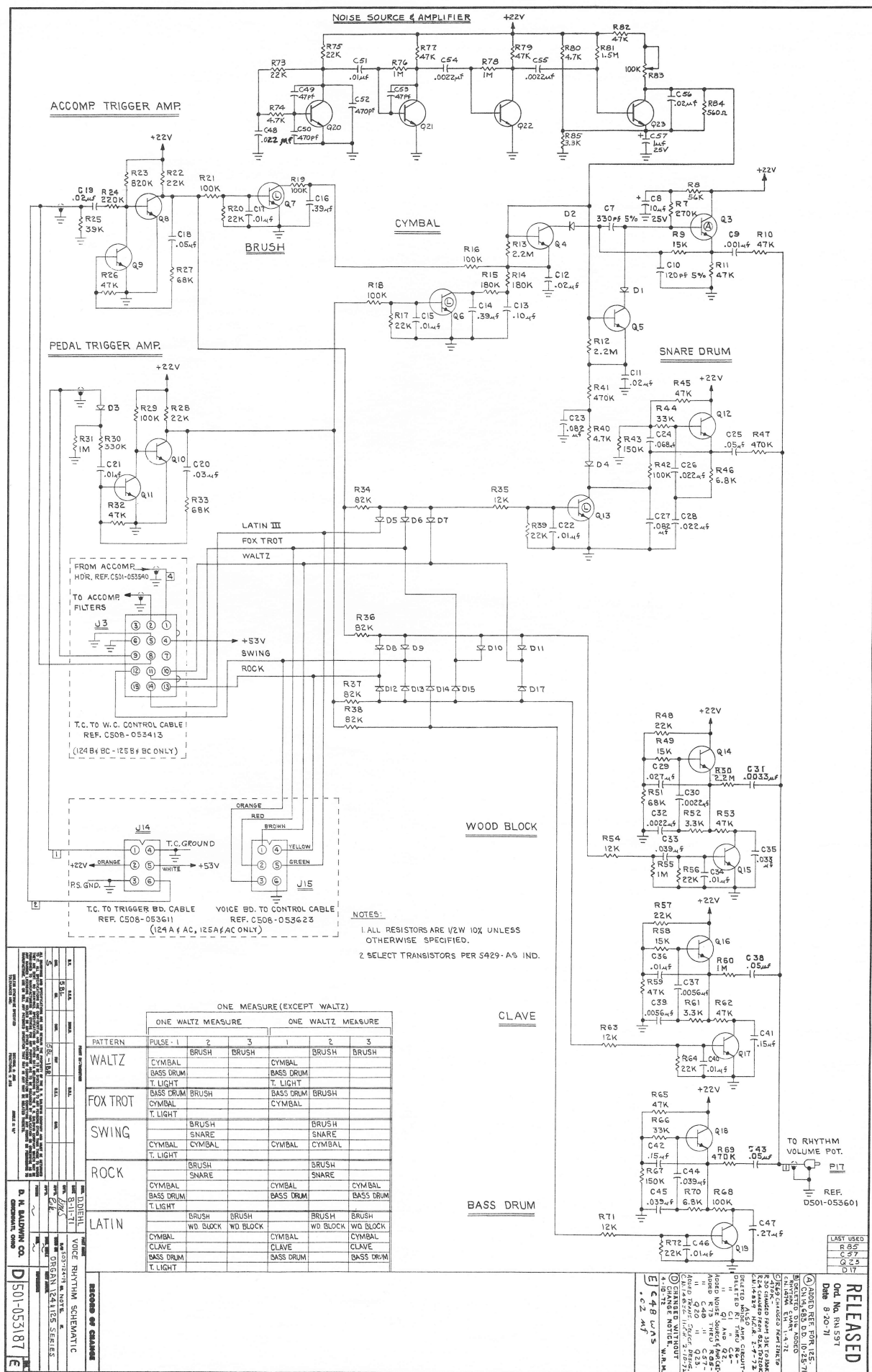


FIGURE 15



POWER SUPPLY DESCRIPTION: (Refer to Schematic C501-053459)

The Model 124 utilizes one power supply, producing all the necessary operating voltages for the organ circuitry.

The power supply is protected against overload by a 1.3 ampere circuit breaker in the primary of the power transformer.

The center-tapped secondary winding of the power transformer (yellow, red/yellow, yellow) is rectified by a pair of diodes, D5 and D6, and filtered by capacitor C5, providing the -20 volt source supply.

This same winding is also rectified by diodes D4 and D3 and filtered by capacitor C6 to provide a +20 volt source. The +20 volt source is filtered by R1 and C3 to provide the +18 volt source. It is also regulated to supply +9 volts for the generators and accessory board.

The +9 volt regulator circuit is a series type regulator. The output voltage (+9 V.D.C.) is sensed by R14 and applied to Q6, a reference amplifier. The emitter voltage of Q6 is set by D7, an 8.2 volt Zener diode, and remains constant. Therefore, any voltage change across R14 will cause Q6 to draw more or less current, varying the conduction of Q4 and Q5, the series regulating elements.

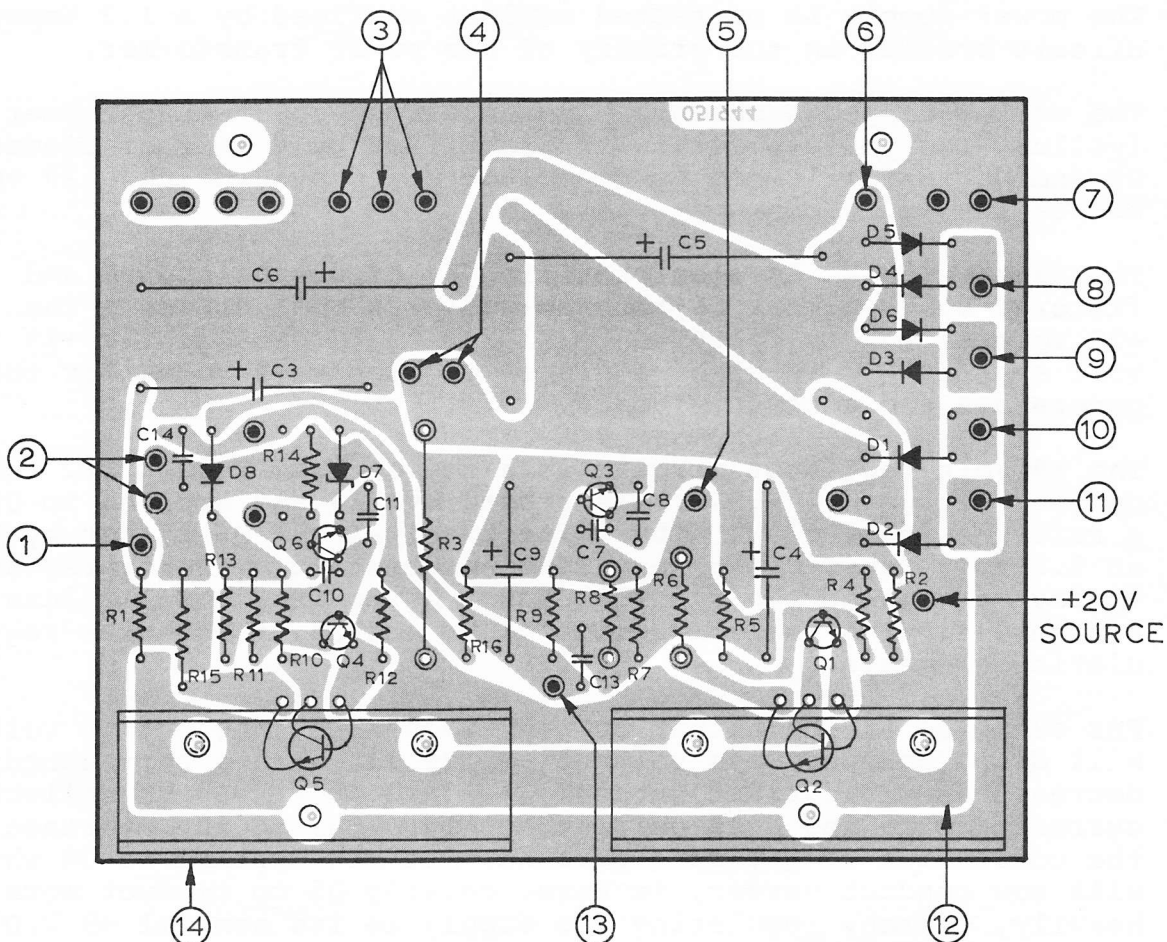
For example, if the output current increases, the output voltage will drop, causing less voltage across R14 with a corresponding decrease in the current through Q6. R13 provides the collector current for Q6 and base current for Q4. Due to the decrease in the conduction of Q6, more current will be supplied to Q4 which will now conduct harder, in turn, causing Q5 to conduct more heavily, thereby regulating the supply to its nominal +9 V.D.C.

The red, red/yellow, red winding is rectified by diode D1 and D2 and filtered by capacitor C2 to provide a +53 V.D.C. source for the power amplifier circuit. Another series regulator drops and regulates this voltage to +28 V.D.C. The operation of this regulator is identical to that of the +9 V.D.C. supply and consists of Q2 (series regulator), Q1 (driver), and Q3 (D.C. amplifier). Both regulator circuits share the 8.2 volt Zener reference diode.

On the preamplifier board, this +28 V.D.C. source is stepped down to +22 V.D.C. for the tone color circuits.

POWER SUPPLY BOARD ASSY.
(Schematic Dia. C501-053459)

WARNING Heatsinks are at
Transistor Collector Potential.



ITEM	DESCRIPTION	WIRE COLOR / PART N ^o
1	+18V SUPPLY OUTPUT	YELLOW
2	+9V SUPPLY OUTPUT	RED
3	GROUND S	BLACK
4	+53V SUPPLY OUTPUT	WHITE
5	+28V SUPPLY OUTPUT	VIOLET
6	-20V SUPPLY OUTPUT	BLUE
7	TRANSFORMER LEAD	RED / YELLOW
8	TRANSFORMER LEAD	YELLOW
9	TRANSFORMER LEAD	YELLOW
10	TRANSFORMER LEAD	RED
11	TRANSFORMER LEAD	RED
12	HEATSINK	B528-051906
13	GROUND "A"	BLACK
14	POWER SUPPLY BOARD ASSY.	B500-052958

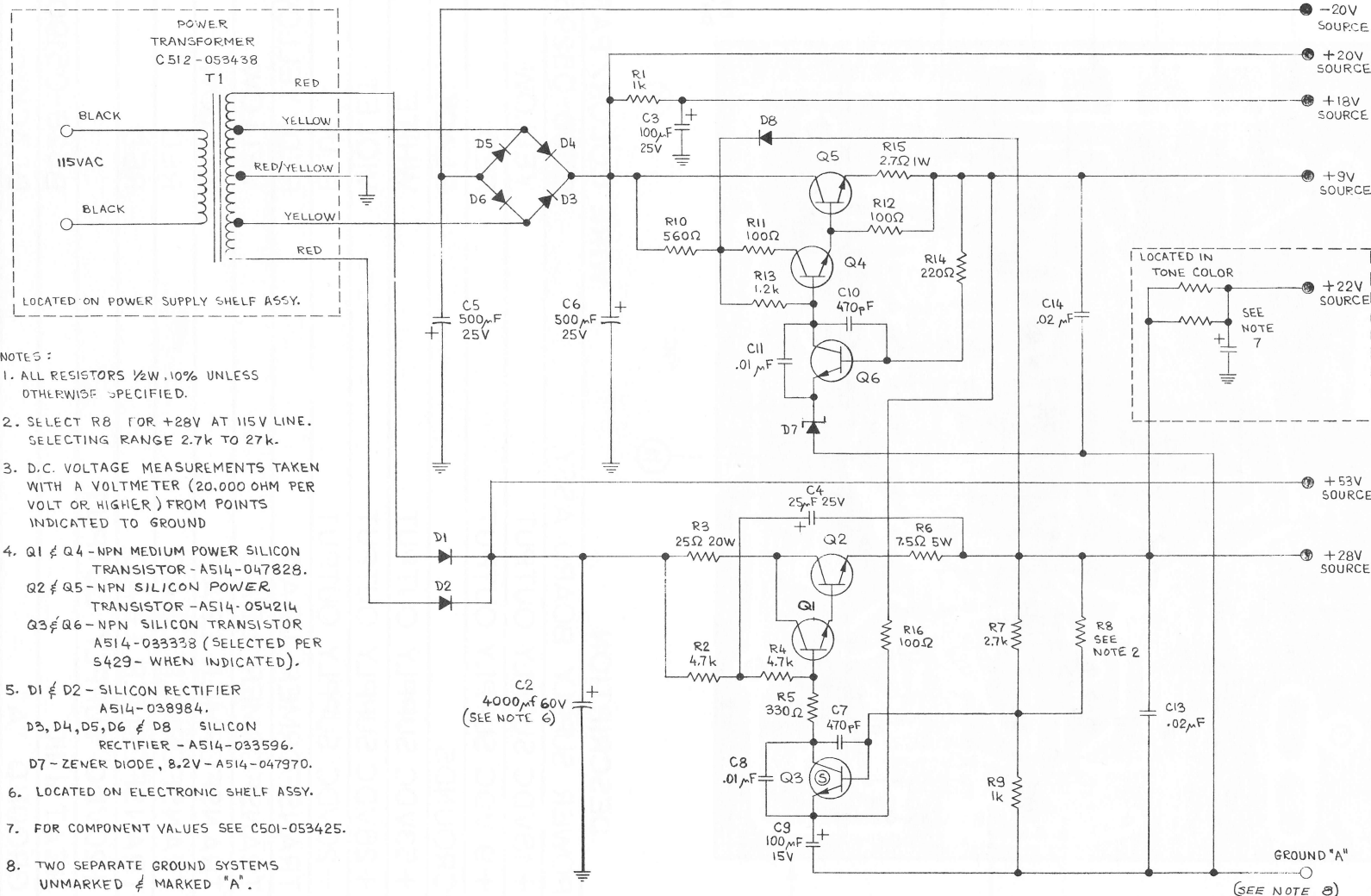
FIGURE 16

RELEASED

Ord. No. RN 597

Date 8-5-71

A) ADDED SELECTION INFO. TO NOTE #4 ON Q3 TRANSISTOR. C.N. 14673 H.C.R. 10-5-71
 B) Q2 & Q5 WERE AS14-047830 R11 WAS 330Ω. R14 WAS 1k C.N. 14,835 CB 2/23/72



RECORD OF CHANGE

PRINT DISTRIBUTION						PART NAME	
B.V.	D.E.Q.	BOUL.	B.S.L.			POWER SUPPLY SCHEMATIC	
CIR.	GR.	CON.	FAT	B.E.I.	CAUL	D/M 503-124-10-10	
S			48L-1BR			USED ON ORGAN 124A.AC.B#BC	
APP'D. <i>Lab</i>						NEXT ASSEMBLY	
FINISH						SUPERSEDES	
D. H. BALDWIN CO. CINCINNATI, OHIO						C 501-053459	
LAST USED						REV.	
R16						B	
C14							
D8							
Q6							

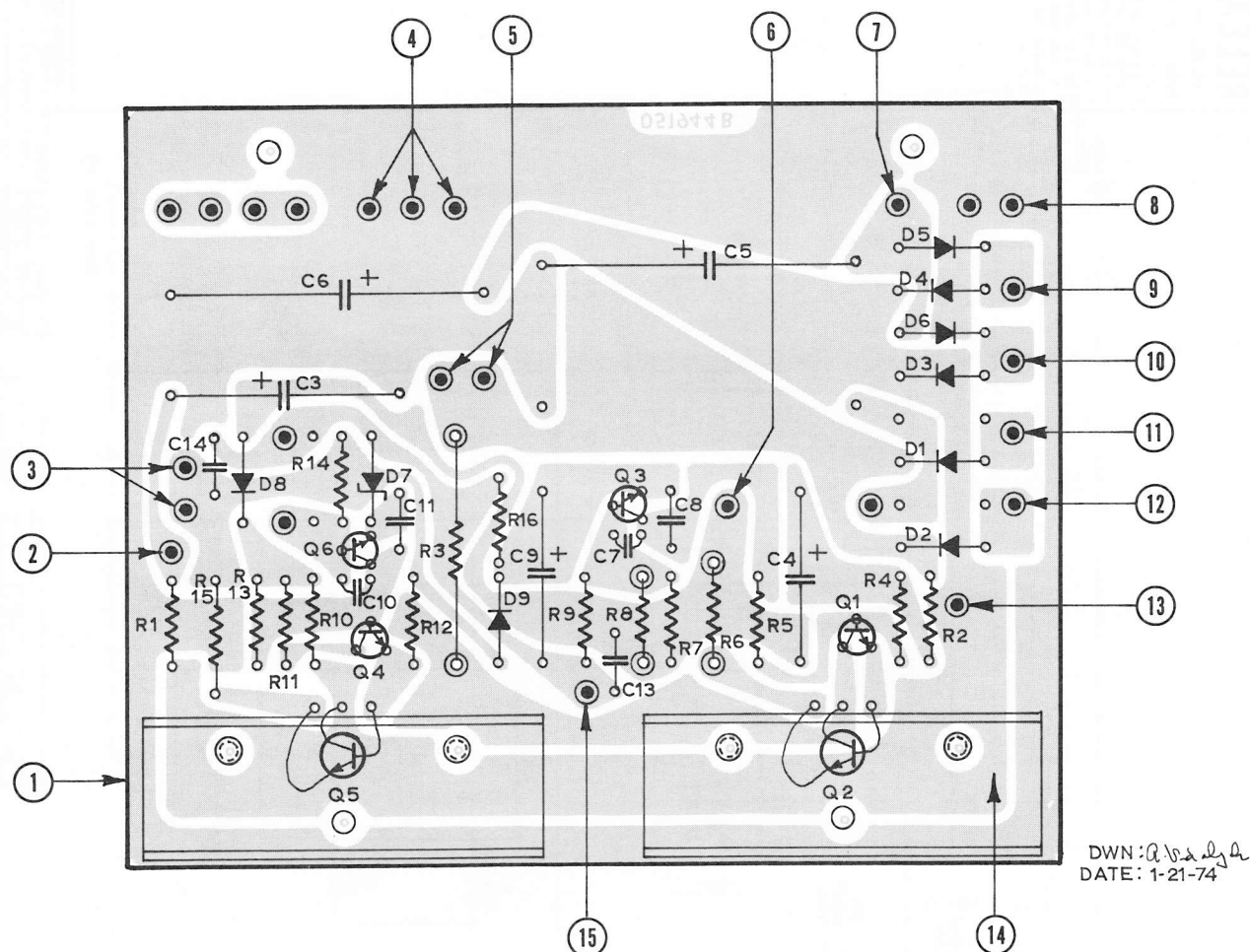
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UNLESS OTHERWISE SPECIFIED
TOLERANCES ARE:

DECIMAL ± .005
FRACTIONAL ± .015

ANGLE ± 16°

POWER SUPPLY BOARD ASSY.
Schematic Dia. N^o C501-053459



ITEM	DESCRIPTION	WIRE COLOR/ PART N ^o
1	POWER SUPPLY BOARD ASSY.	B500-052958
2	+18VDC SUPPLY OUTPUT	YELLOW
3	+9 VDC SUPPLY OUTPUT	RED
4	GROUND	BLACK
5	+53VDC SUPPLY OUTPUT	WHITE
6	+28VDC SUPPLY OUTPUT	VIOLET
7	-20VDC SUPPLY OUTPUT	BLUE
8	TRANSFORMER LEAD	RED/YELLOW
9	TRANSFORMER LEAD	YELLOW
10	TRANSFORMER LEAD	YELLOW
11	TRANSFORMER LEAD	RED
12	TRANSFORMER LEAD	RED
13	+20VDC SUPPLY OUTPUT	
14	HEATSINK	B528-051906
15	GROUND "A"	BLACK

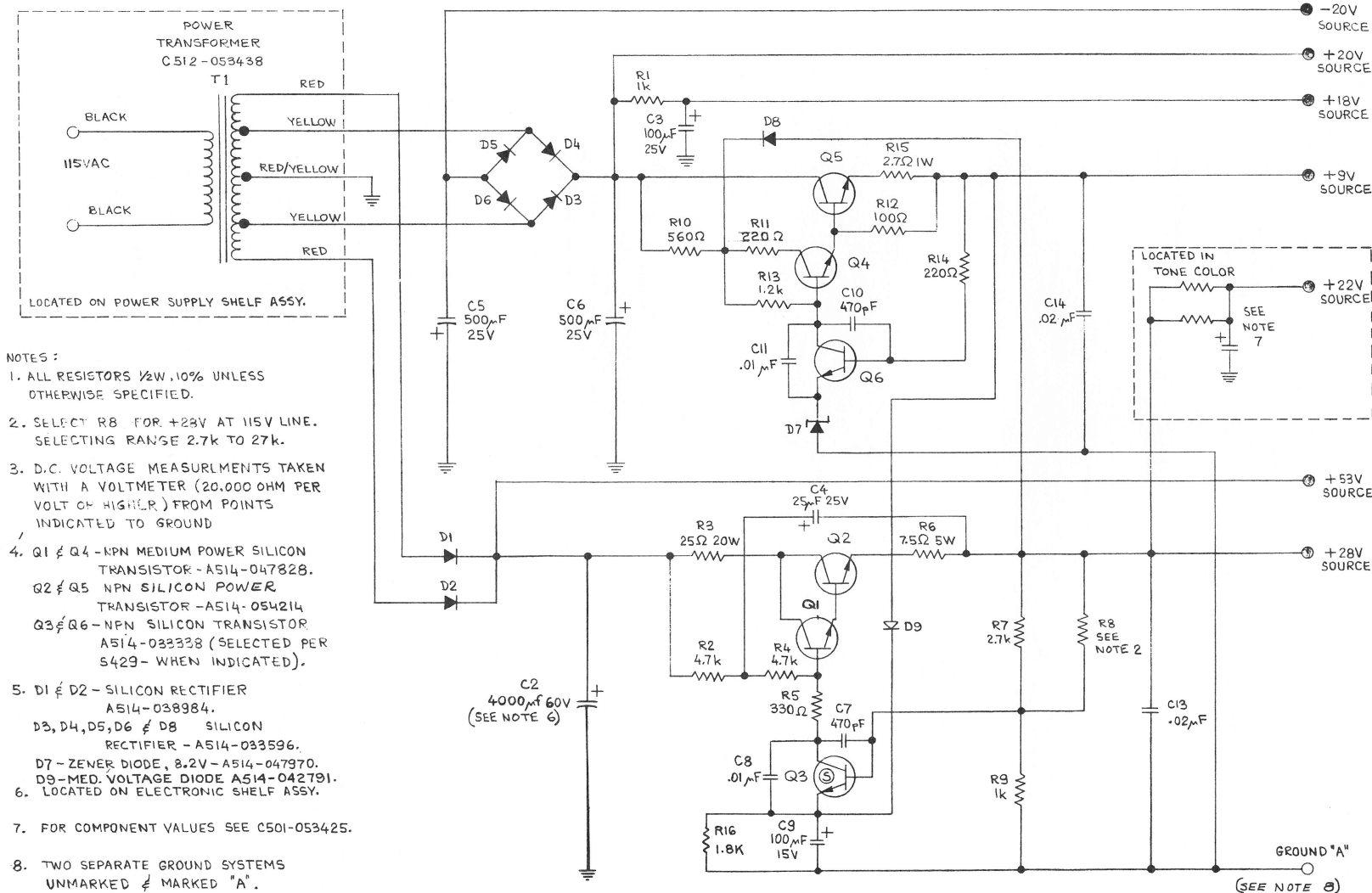
FIGURE 16A

RELEASED

Ord. No. RN 597

Date 8-5-71

- A) ADDED SELECTION INFO. TO NOTE #4 ON Q3 TRANSISTOR. C.N. 14673 H.C.R. 10-5-71
- B) Q2 & Q5 WERE AS14-047830 R11 WAS 330Ω. R14 WAS 1k C.N. 14,835 CB 2/23/72
- C) R16 WAS 100Ω. ADDED Q9 - MED. VOLT. DIODE. C.N. 15,303 D.L.L. 3-30-73
- D) R11 WAS 100Ω. C.N. 15,815 8-14-73 W.R.M.



RECORD OF CHANGE

PRINT DISTRIBUTION						REV.		PART NAME	
S.Y.	D.S.A.	DOUL.	FAY	D.E.L.	GUL	REV.	DATE	POWER SUPPLY SCHEMATIC	REV.
5	BL					2-21-72			
LAST USED									
R16									
C14									
D9									
Q6									

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DESIGN: D. H. BALDWIN
FUNCTIONAL: D. H. BALDWIN
SCALE: 1/8"

D. H. BALDWIN CO.
CINCINNATI, OHIO

REV. 1
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REV. 99
2-21-72
REV. 100
2-21-72

C 501-053459

D

Reference: Schematic - C501-051929

The Model 124 organ contains a single 25W amplifier located on the generator shelf assembly on the bass side of the console (Fig. 19).

The amplifier circuit, including heat sinks, is contained on a single printed circuit board assembly, and is fastened to the console by four (4) screws.

CIRCUIT DESCRIPTION:

The circuit is a Quasi-Complementary Silicon Power amplifier type. The output stage employs two (2) silicon NPN power transistors, each mounted on a separate heat sink. The driver circuit contains a complementary pair of silicon NPN-PNP medium power transistors. The predrivers, or voltage amplifier circuits, consist of silicon PNP and NPN transistors operating as Class A amplifiers.

Two (2) NPN transistors are used as current limiters for amplifier overload protection.

Referring to the 25W Amplifier Schematic, C501-051929, the base of the first voltage amplifier stage (transistor Q1) is biased from +22V supply via R7 and R11 resistors so that, in conjunction with the D.C. feedback through R12, it sets the D.C. operating point at the junction of Q5 emitter and Q6 collector to about one-half the supply voltage.

The input signal, applied from the amplifier level set potentiometer, is amplified by voltage amplifiers Q1 and Q2 to a sufficient level to drive the output stages. The amplified signal from the collector of Q2 is applied to both bases of the complementary drivers Q3 and Q4, and will swing positively toward +53V supply and negatively toward ground. The positive excursion will turn on the NPN driver (Q3) while the negative excursion will turn on the PNP driver (Q4). Transistors Q3 and Q5, operating as two emitter followers (Darlington connection), provide a current to the load without phase inversion. Transistor Q4 operates as a common emitter amplifier and its collector supplies signal 180° out of phase to the output stage Q6, which is also a common emitter amplifier. Q6 will invert the signal again and will provide the current for the load. Transistors Q3 and Q4 are slightly forward biased by diodes D1, D2 and resistor R25 to assure the proper switching point and minimize crossover distortion. Resistors R5 and R20, due to the conduction of Q3 and Q4, develop a voltage drop which forward biases output transistors Q5 and Q6. Current flowing through output transistors, under no signal condition (idling current), is in the order of a few tenths of a milliamperes so that the amplifier is operating in Class AB mode.

Resistors R1, R2 and capacitor C1 provide a bootstrapping action to assure sufficient drive to Q3 transistor when the output signal goes positive. The positive output voltage is coupled via C1 capacitor to the junction of R1 and R2, boosting the voltage to allow sufficient current to drive Q5 output transistor.

The output transistor emitter resistors R10 and R23 are fusing type resistors, which will open the circuit under high currents and prevent any further damage to the output power transistors.

Additional short circuit protection is provided by the current limiting transistors Q7 and Q8. Under high current condition, voltage drop on fuse link resistors R10 and R23 will be high enough to forward bias transistors Q7 and Q8, which will saturate and limit the drive to the driver transistors.

Components R6, R9, and D3; and R16, R19, and D4 reduce the limiting action of Q7 and Q8, respectively, when an output signal is present (not shorted), permitting the amplifier to be driven to full output.

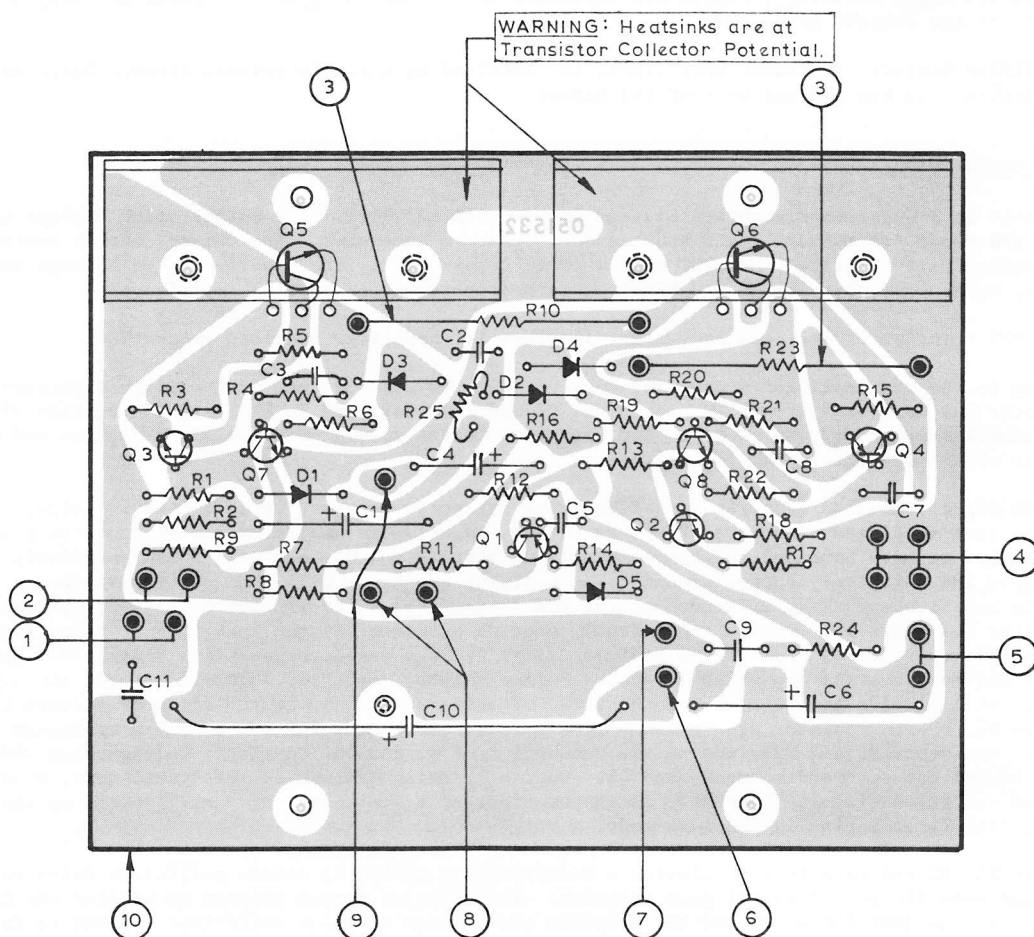
Capacitor C2 provides a high frequency limit for the amplifier.

The noise suppressor circuit consists of diode D5 and capacitor C6 and an external network (R19, R20 and C11 on the preamplifier board assembly) which, when the organ power is switched on, keeps the outputs of the amplifiers near ground until all supply voltages are stabilized, thus preventing any audible transients. When the organ is turned on, the +53V supply forward biases diode D5 via R4 and C11 (500 mfd), connected in series, and rapidly charges capacitor C6, temporarily saturating Q1. After stability is achieved, diode D5 cuts off, permitting the normal operation of the amplifier.

The 25W amplifier drives an 8 ohm speaker, via the C10 coupling capacitor.

25W POWER AMPLIFIER BOARD ASSY.

(Schematic Dia. C501-051929)



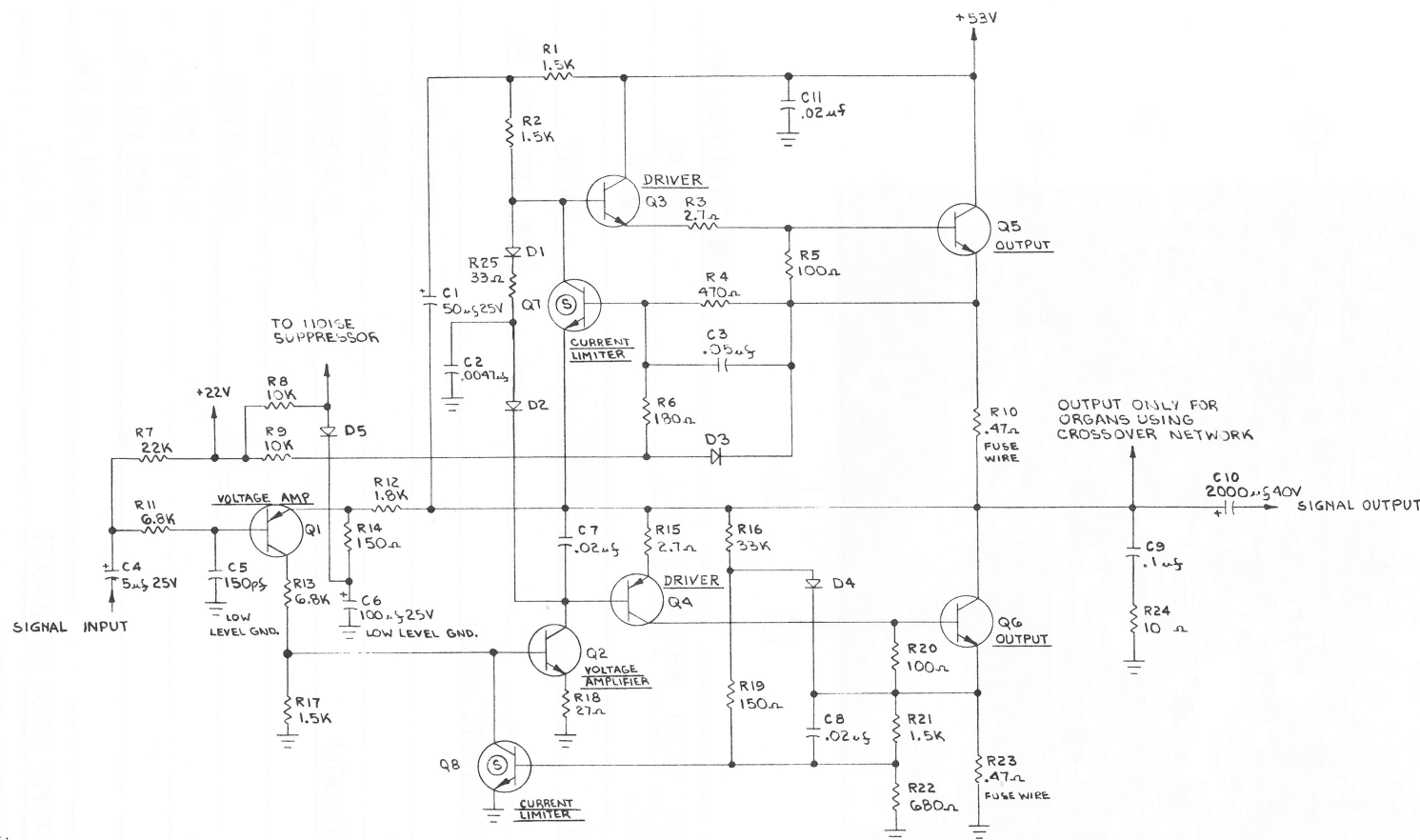
ITEM	DESCRIPTION	WIRE COLOR / PART N ^o
1	+53V SUPPLY INPUT	WHITE
2	+24V SUPPLY INPUT	ORANGE
3	FUSING WIRE	A514-033375
4	HIGH LEVEL GROUNDS	BLACK 18AWG
5	LOW LEVEL GROUNDS	BLACK
6	SIGNAL OUTPUT	
7	CROSSOVER SIGNAL OUTPUT (When Applicable)	
8	TO NOISE SUPPRESSOR CIRCUIT	RED
9	SIGNAL INPUT	SNGL. COND. SH.
10	25W AMPLIFIER BOARD ASSY.	B500-051926

FIGURE 17

RELEASED

Ord. No. RH 592
Date 3-4-71

A ADDED R25
C.N. 14,499 5-21-71 W.R.M.
B R25 WAS 39Ω
C.N. 14,722 11-11-71 W.R.M.
C Q5 & Q6 WERE A514-047830
C.N. 1835 CB 2/23/72



- NOTES:
1. ALL RESISTORS ARE $\frac{1}{2}W$ 10% UNLESS OTHERWISE SPECIFIED.
 2. D.C. VOLTAGE MEASUREMENTS TAKEN WITH A VOLT-METER (20,000 OHM PER VOLT OR HIGHER) FROM POINT INDICATED TO GROUND.
 3. ALL GROUNDS ARE HIGH LEVEL AMPLIFIER GROUNDS UNLESS OTHERWISE SPECIFIED.
 4. Q1 - PNP SILICON TRANSISTOR (A514-044910)
Q2 & Q3 - NPN MEDIUM POWER SILICON TRANSISTOR (A514-047829)
Q4 - PNP MEDIUM POWER SILICON TRANSISTOR (A514-047829)
Q5 & Q6 - NPN SILICON POWER TRANSISTOR (A514-054214)
Q7 & Q8 - NPN SILICON TRANSISTOR (A514-033339) SELECTED PER 5429-2
D1, D2, D3, D4 & D5 - MEDIUM VOLTAGE DIODE (A514-042791)

LAST COMP NR USED

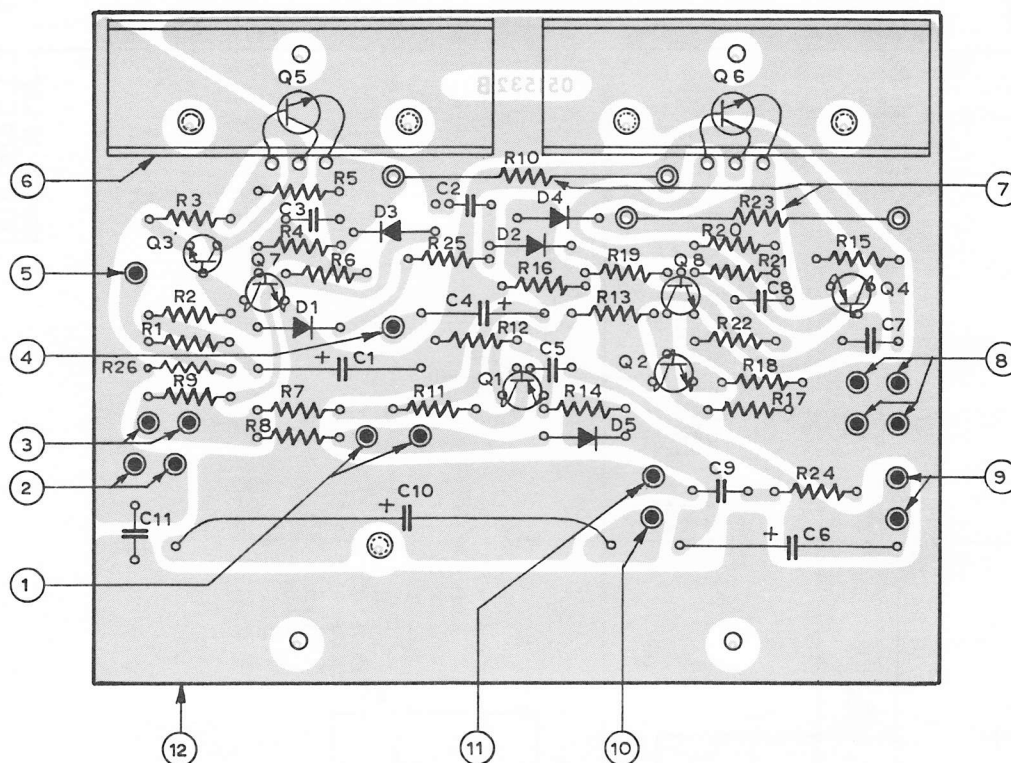
R	C	Q	D
25	11	8	5

RECORD OF CHANGE

PRINT DISTRIBUTION						PART NAME	
S.N.	D.E.Q.	BOSS.	S.E.L.			25W AMPLIFIER SCHEMATIC	
SBL						1-21-71	
CHL	GR.	COL.	FAY	S.E.L.	CHL	3-2-71	
S			SBL 182			USED ON C6301130	
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UNLESS OTHERWISE SPECIFIED TOLERANCE ARE:						SUPERSEDES	
DECIMAL $\pm .005$ FRACTIONAL $\pm .015$						D. H. BALDWIN CO. CINCINNATI, OHIO	
						C 501-051929 C	

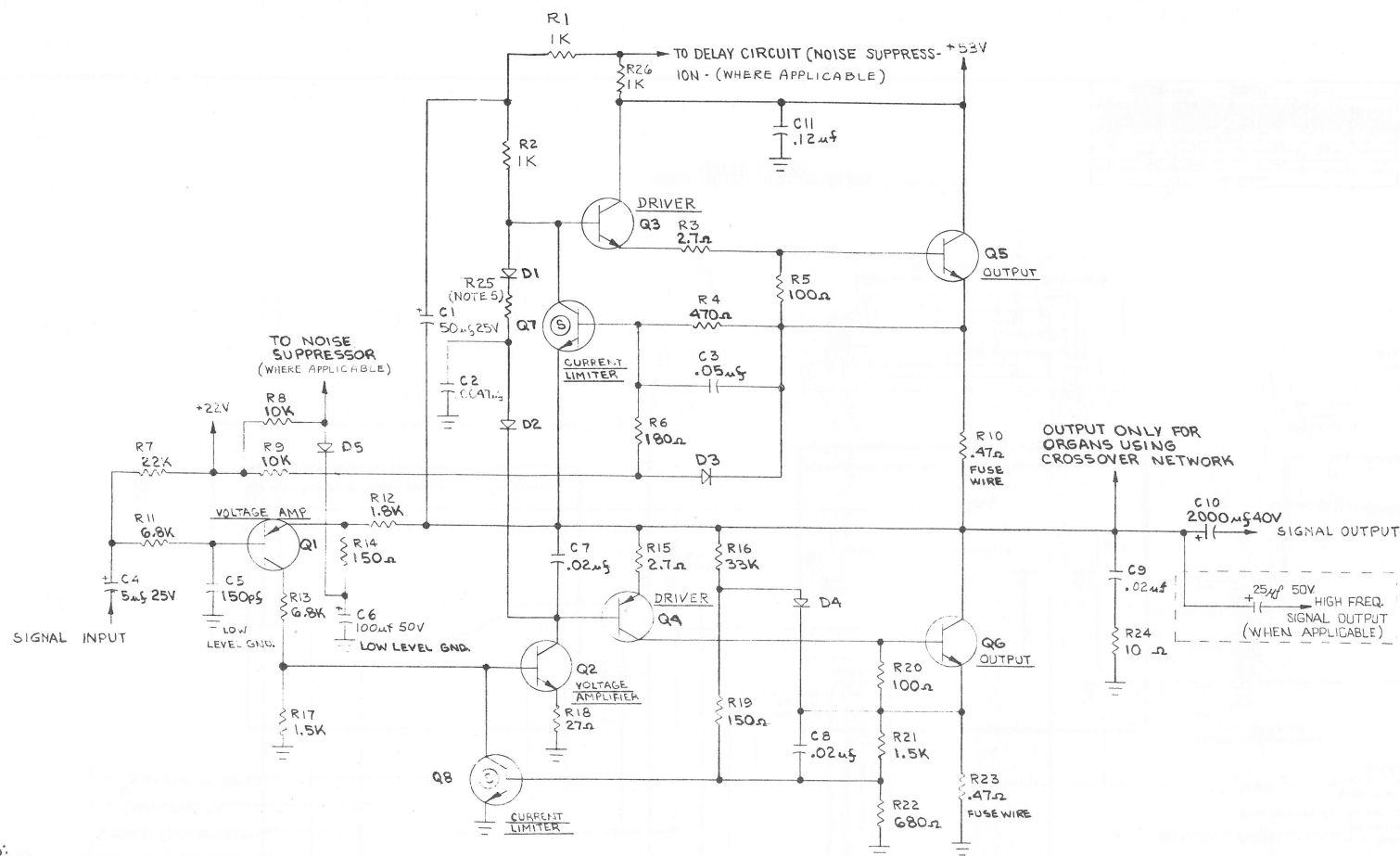
25W POWER AMPLIFIER BOARD ASSEMBLY

SCHEMATIC No. C501-051929



ITEM	DESCRIPTION	WIRE COLOR/PART NO.
1	TO NOISE SUPPRESSOR CIRCUIT (WHEN APPLICABLE)	RED #2
2	+53VDC SUPPLY INPUT	WHITE
3	+22VDC SUPPLY INPUT	ORANGE
4	SIGNAL INPUT	SNGL. COND. SH. #4
5	TO DELAY CIRCUIT (WHEN APPLICABLE)	
6	HEATSINK	B528-051906
	TRANSISTOR SOCKET	B507-033322
	TRANSISTOR MICA INSULATOR	A514-033359
	SILICON COMPOUND	A249-016587
7	FUSING WIRE	A514-033375
8	HIGH LEVEL GROUND	BLACK #18 AWG
9	LOW LEVEL GROUND	BLACK #18 AWG
10	SIGNAL OUTPUT	BROWN #18 AWG
11	CROSSOVER SIGNAL OUTPUT (WHEN APPLICABLE)	VIOLET
12	25W POWER AMPLIFIER BOARD ASSEMBLY	B500-051926

FIGURE 17 A



NOTES:

1. ALL RESISTORS ARE 1/2W 10% UNLESS OTHERWISE SPECIFIED.
 2. D.C. VOLTAGE MEASUREMENTS TAKEN WITH A VOLTMETER (20,000 OHM PER VOLT OR HIGHER) FROM POINT INDICATED TO GROUND.
 3. ALL GROUNDS ARE HIGH LEVEL AMPLIFIER GROUNDS UNLESS OTHERWISE SPECIFIED.
 4. Q1 - PNP SILICON TRANSISTOR (A514-044910)
Q2 & Q3 - NPN MEDIUM POWER SILICON TRANSISTOR (A514-047828)
Q4 - PNP MEDIUM POWER SILICON TRANSISTOR (A514-047829)
Q5 & Q6 - NPN SILICON POWER TRANSISTOR (A514-054214)
Q7 & Q8 - NPN SILICON TRANSISTOR (A514-033338) SELECTED PER 5429-2
D1, D2, D3, D4 & D5 - MEDIUM VOLTAGE DIODE (A514-042791)
 5. SELECT R25 TO OBTAIN 400 mV \pm 50 mV AT BASE OF Q6 (REF. 5607).
- CAUTION: AMPLIFIER MUST BE COLD WHEN SELECTING THIS VOLTAGE.

PRINT DISTRIBUTION					
S.V.	D.E.Q.	BOULD.	B.R.L.		
3	BL				
	GR.	CON.	FAY	B.E.I.	CAR.
S			48-126		

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UNLESS OTHERWISE SPECIFIED
TOLERANCES ARE:

DECIMAL \pm .005
FRACTIONAL \pm .015

ANGLE \pm 16°

LAST COMP NR USED			
R	C	Q	D
26	11	8	5

RECORD OF CHANGE	
DATE	2-21-71
BY	3-2-71
APP'D	48-126
FINISH	2-21-71
REV.	

PART NAME	
25W AMPLIFIER SCHEMATIC	
DATE	2-21-71
BY	3-2-71
APP'D	48-126
FINISH	2-21-71
REV.	

D. H. BALDWIN CO.	
CINCINNATI, OHIO	

SUPERSEDES	
C	501-051929

RELEASED

Ora. No. RN 592

Date 3-4-71

- A. ADDED R25
C.N. 14,499 5-21-71 W.R.M.
- B. R25 WAS 39 Ω
C.N. 14,722 11-11-71 W.R.M.
- C. Q5 & Q6 WERE A514-047830
C.N. 835 CB 2/23/72
- D. C1 WAS 100 μ F @ 25V,
CHANGED TO 100 μ F @ 50V
C.N. 14,907 H.C.R. 5-11-72
- E. C11 WAS .02 μ F, C9 WAS 1.5 μ F
ADDED NOTES 5 & 6.
C.N. 14,974 D.D. 7-31-72
- F. ADDED INFORMATION FOR
TECHNICAL SERVICE DEPT.
C.N. 15,077 H.C.R. 9-22-72
- G. REVISED NOTES 5 & 6.
C.N. 15,303 D.L.L. 4-4-73
- H. R1 WAS 1.5K; R2 WAS
1.5K; R25 WAS 39 Ω ;
ADDED R26. REVISED
NOTE 5. DELETED NOTE 6.
DELETED "REF. TO MOD."
NOTES & ADDED "WHERE
APPLICABLE" LAST
R 18 WAS 25.
C.N. 15,404 H.C.R. 5-17-73
- I. REVISED TO PROVIDE
HIGH FREQ. SIGNAL
OUTPUT (WHEN APPLICABLE).
C.N. 15,652 M.S. 12-4-73

Ord. No. R.N. 597
Date: 8-30-31

Old. No. R.N. 551
Date 8-20-71

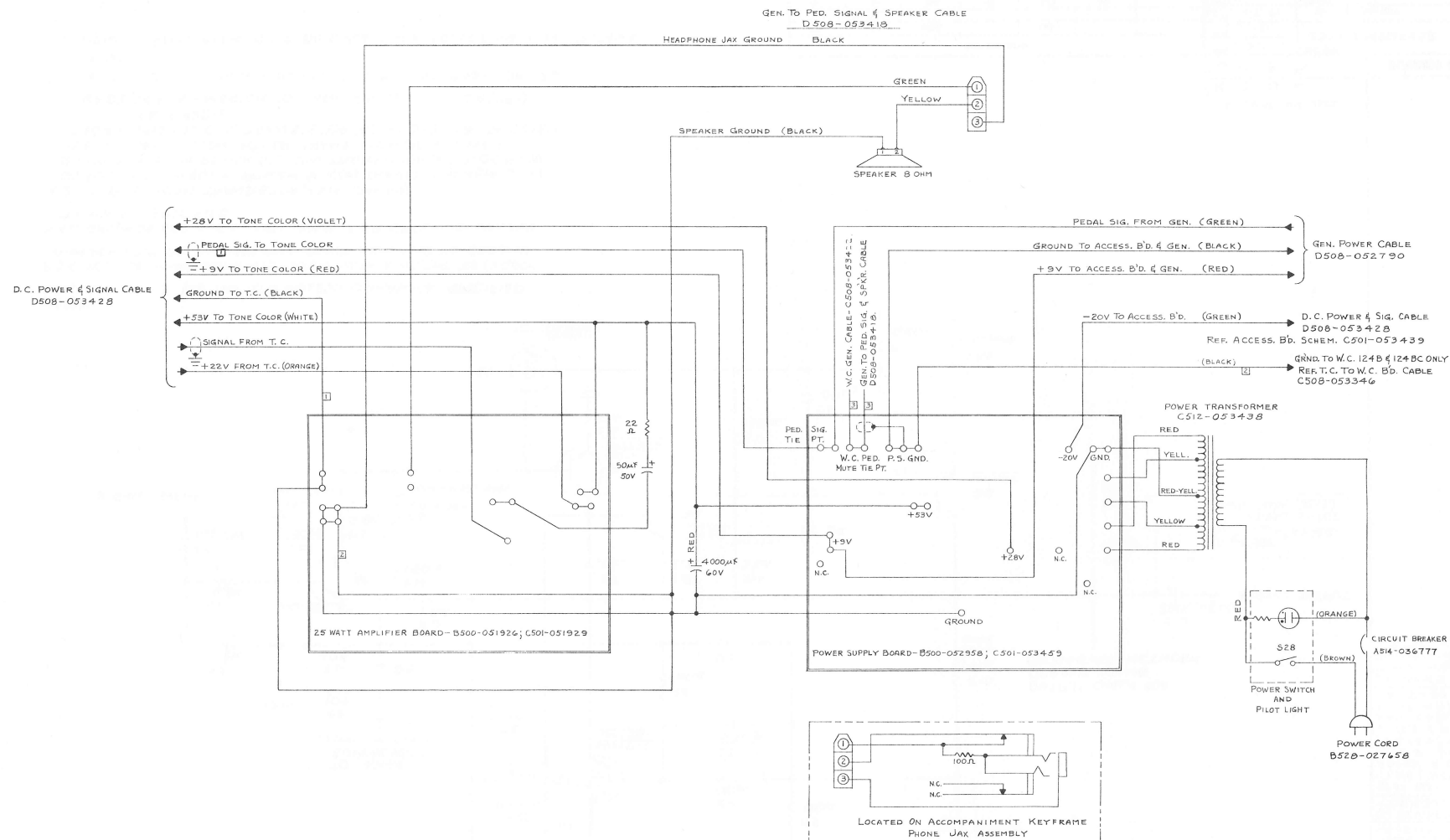
A) ADDEL NOTE 1
CN 14.72% DP 11-9-71

B) 50 μ F 50V CAPACITOR

B) 50 μ 50V CAPACITOR
WAS 100 μ 50V
CN14,858 CB 2/24/72

CN14,858 CB 2/24/72

CN14,858 CB 2/24/72



NOTE 1 REFER TO B501-054123 FOR MODIFICATIONS
FOR 230V SUPPLY

FOR 230V SUPPLY

[illegible][illegible]

Ord. No. R.N. 597
Date 8-20-71

A) ADD'L NOTE 1
ON 10-22-71 DP 11-9-71

B) 50 μ F 50V CAPACITOR

WAS 100L3,50V
CN14,858 CB 2/24/72
DELETED POWER 000

DELETED POWER CORD
& ADDED INTERLOCK.
G.N. 15,211 1-30-73 W.R.M.

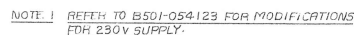
(D) DELETED CIRCUIT
BREAKER & ADDED 2
AMP FUSE.

(E) REVISED 25 WATT

AMPLIFIER BD. CONNECTIONS.
C.N. 15,303
D.L.L. 4-4-73

DELETED 4702 RES.
OFF DELAY CKT. TERM.
OF 3.5W AND 30

C.N. 154D-4 NCR. 5-21-73

[illegible]

The Model 124A is the organ equipped with the Auto Rhythm feature.

The 124A section contains the following information:

- 1). The Auto Rhythm Trigger Circuitry that is used in conjunction with the Rhythm Voice Generation Circuitry. Rhythm Voice Generation Circuitry is common to the 124 series.
- 2). The Pedal Sustain and Pedal Filter Circuitry. The circuits are unique to the 124A organs.
- 3). The Accessory Board assembly does not contain the cassette regulated power supply components necessary to enable cassette field installation.

The Accessory Board information for both the 124A and 124B is given in the 124 series section of this manual.

For description of other 124A circuitry, refer to the 124 series section.

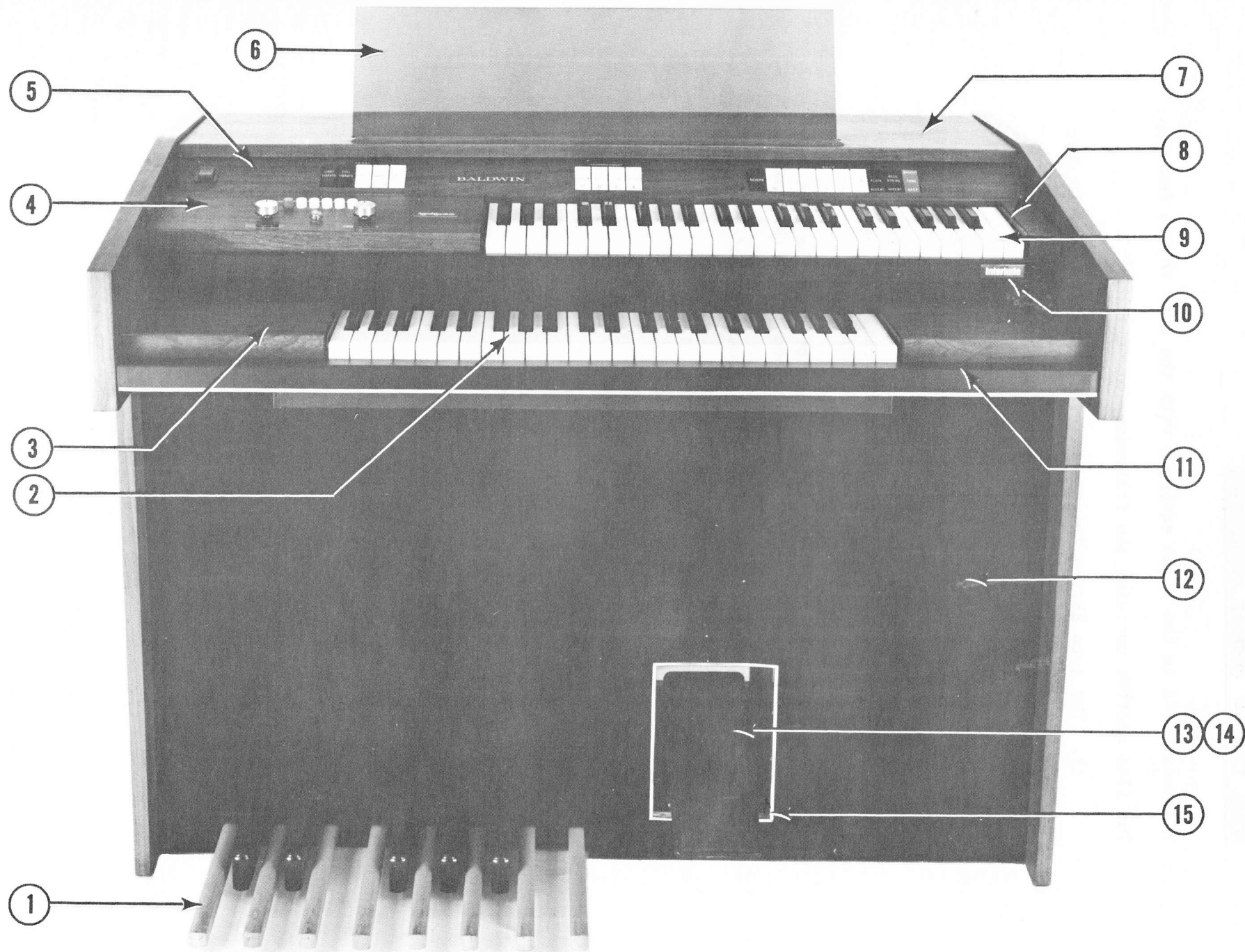


FIG. 18-124A ORGAN FRONT VIEW

DESCRIPTION FIG. 18

ITEM	DESCRIPTION	PART NUMBER
1	13 NOTE PEDAL ASSY. - 124A & AC	D500-053456
2	ACCOMPANIMENT MANUAL	SEE PART LIST
3	ACCOMP. BASS KEYCAP	X500-053172
4	SOLO BASS KEYCAP FINAL ASSY. - 124A & AC	X500-053515
5	TONE COLOR ASSY.	SEE FIG. 20
6	MUSIC DESK - PLEXIGLASS	C105-053450
7	UPPER LID ASSY.	C060-053307
8	SOLO TREBLE KEYCAP	X500-052474
9	SOLO MANUAL	SEE PART LIST
10	NAMEPLATE - INTERLUDE	A249-053652
11	ACCOMP. TREBLE KEYCAP	X500-052471
12	GRILLE CLOTH	B244-053621
13	EXPRESSION PEDAL ASSY.	D500-053250
14	EXPRESSION PEDAL POTENTIOMETER (50K)	B509-048890
15	EXPRESSION PEDAL TRIM MOULDING	A518-052823

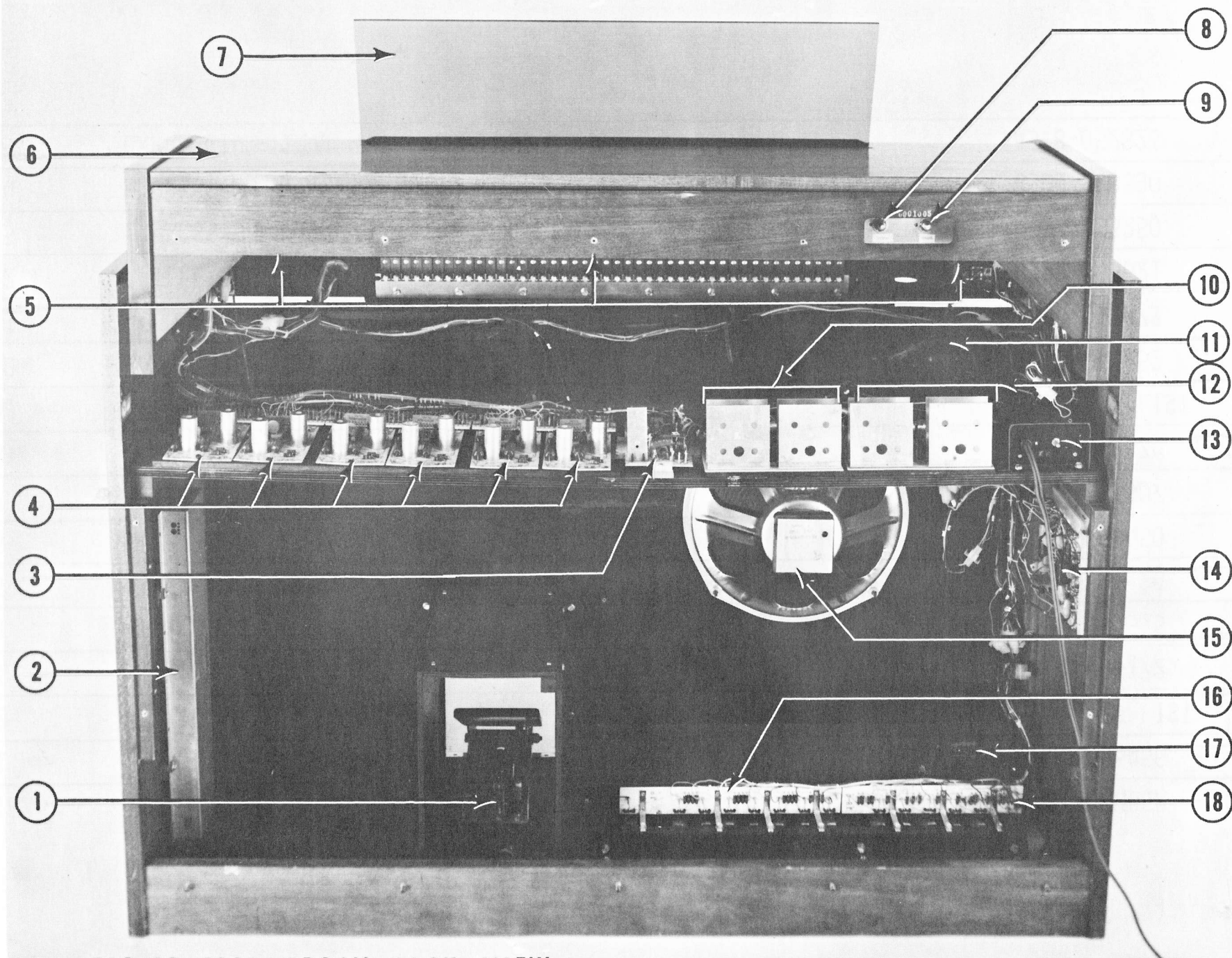


FIG. 19 - 124A ORGAN BACK VIEW

DESCRIPTION FIG. 19

ITEM	DESCRIPTION	PART NUMBER
1	EXPRESSION PEDAL ASSY.	D500-053250
2	REVERB UNIT ASSY.	X500-053637
3	ACCESSORY BOARD ASSY. - 124A	B500-053858
	- 124AC, B & BC	B500-053253
4	GENERATOR BOARDS ASSY.	SEE FIG. 6
5	THREE (3) SCREWS SECURING UPPER LID	
6	UPPER LID ASSY.	C060-053307
7	MUSIC DESK - PLEXIGLASS	C105-053450
8	REVERB LEVEL SET POTENTIOMETER (100K OHMS)	B509-040783
9	VOLUME LEVEL SET POTENTIOMETER (100K OHMS)	B509-040783
10	25W POWER AMPLIFIER BOARD ASSY.	B500-051926
11	POWER TRANSFORMER	C512-053438
12	POWER SUPPLY BOARD ASSY.	B500-052958
13	CIRCUIT BREAKER 1.3A	A514-036777
14	AUTO RHYTHM TRIGGER BOARD ASSY.	C500-053634
15	SPEAKER (12", 8 OHMS)	A513-024925
16	8 NOTE PEDAL SUSTAIN BOARD ASSY. - 124A & AC	C500-047793
17	PEDAL SWITCH COVER	D502-039205
18	5 NOTE PEDAL SUSTAIN BOARD ASSY. - 124A & AC	C500-047808

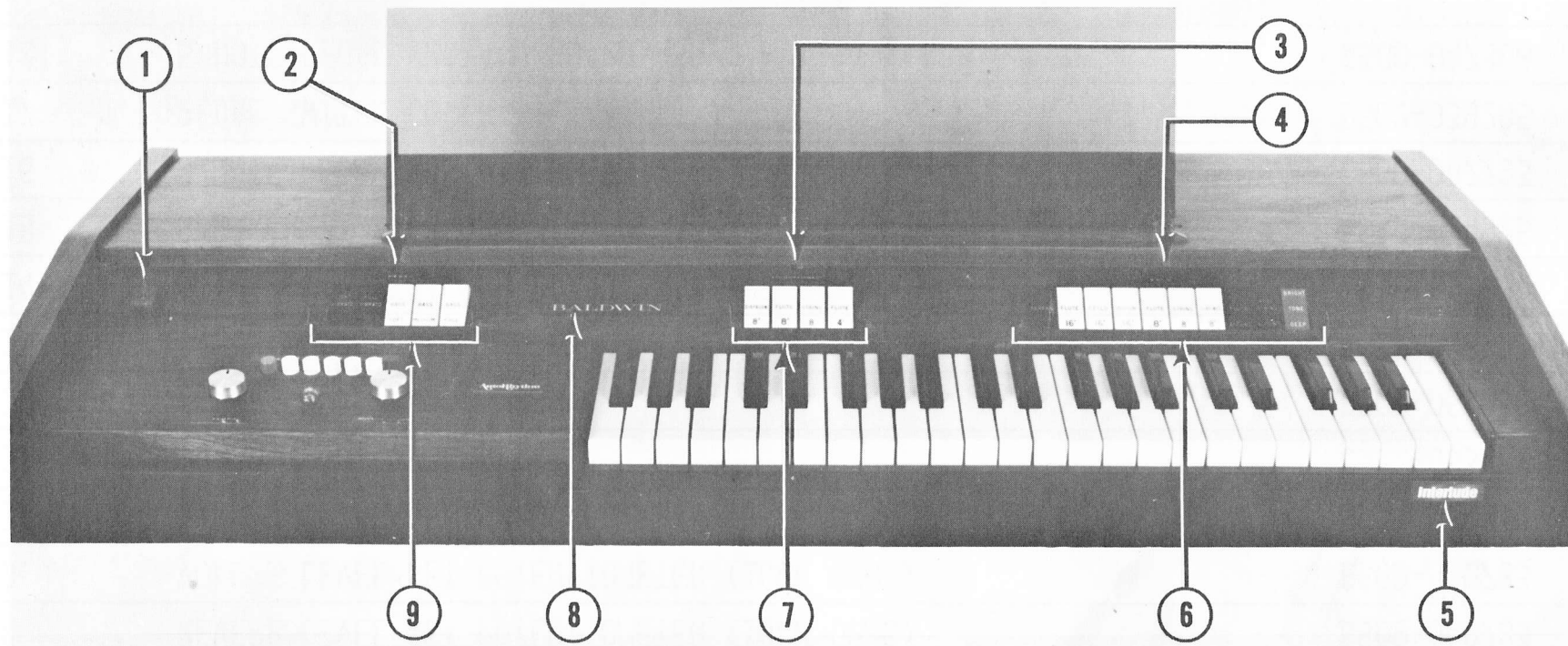


FIG. 20 - 124A & AC TONE COLOR STOP TABLETS

ITEM	DESCRIPTION	PART NUMBER
1	POWER SWITCH	B506-052168
2	NAMEPLATE - PEDAL	A249-052050
3	NAMEPLATE - ACCOMPANIMENT	A249-052051
4	NAMEPLATE - SOLO	A249-052052
5	NAMEPLATE - INTERLUDE	A249-053652
6	SOLO FILTER STOP TABS	SEE PART LIST
7	ACCOMP. FILTER STOP TABS	SEE PART LIST
8	NAMEPLATE - BALDWIN	A249-052192
9	VIBRATO & PEDAL STOP TABS	SEE PART LIST

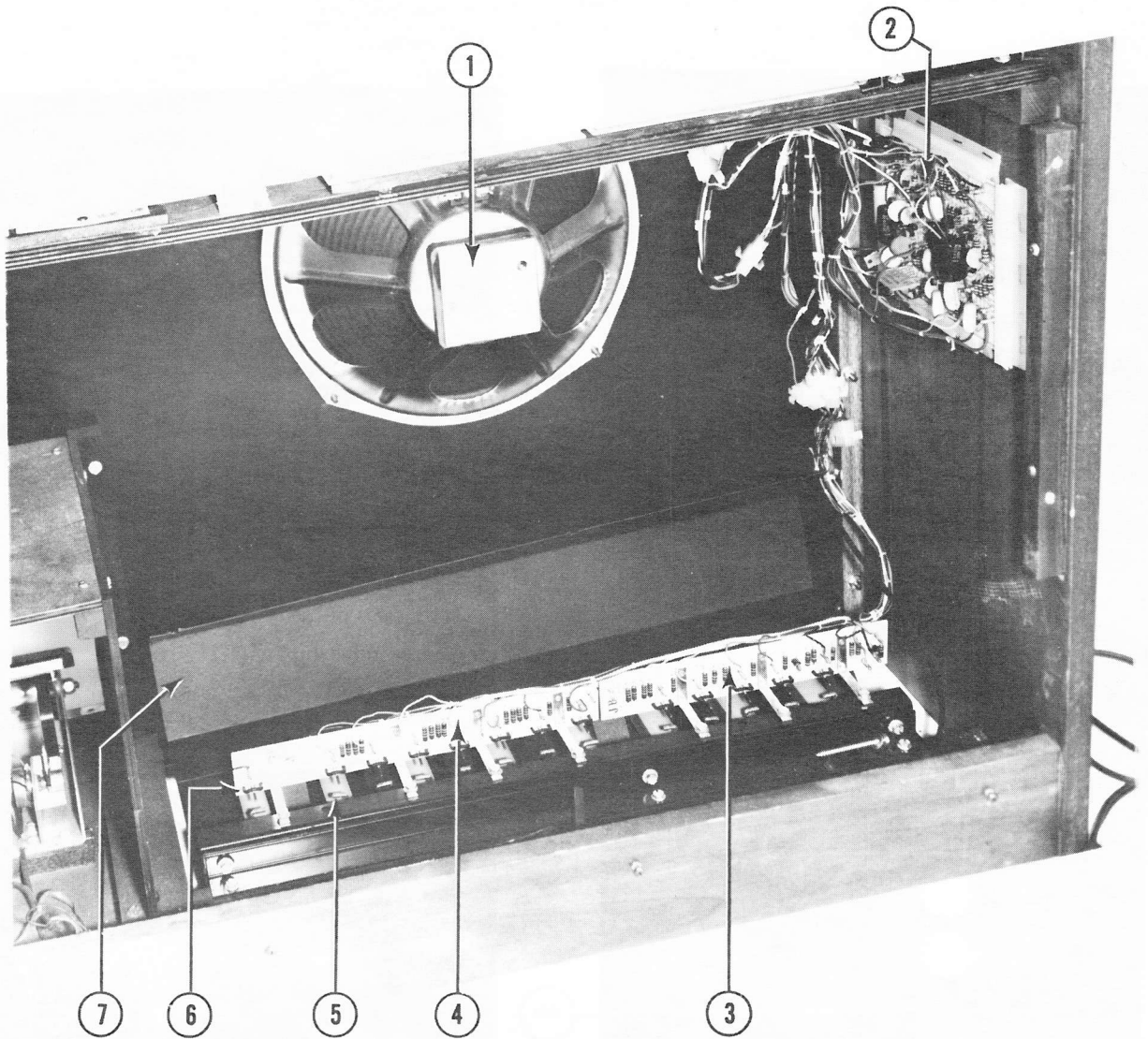


FIG. 21 - MODEL 124A & AC PEDAL SUSTAIN BOARDS

ITEM	DESCRIPTION	PART NUMBER
1	SPEAKER 12", 8 OHMS	A513-024925
2	AUTO RHYTHM TRIGGER BOARD ASSY.	C500-053634
3	5 NOTE PEDAL SUSTAIN BOARD - 124A & AC	C500-047808
4	8 NOTE PEDAL SUSTAIN BOARD - 124A & AC	C500-047793
5	PEDAL ACTUATOR	A237-039159
	VINYL TUBING (7/16" LONG)	A244-039801
6	SPRING CONTACT ASSY.	A500-035728
7	PEDAL SWITCH COVER	D502-039205

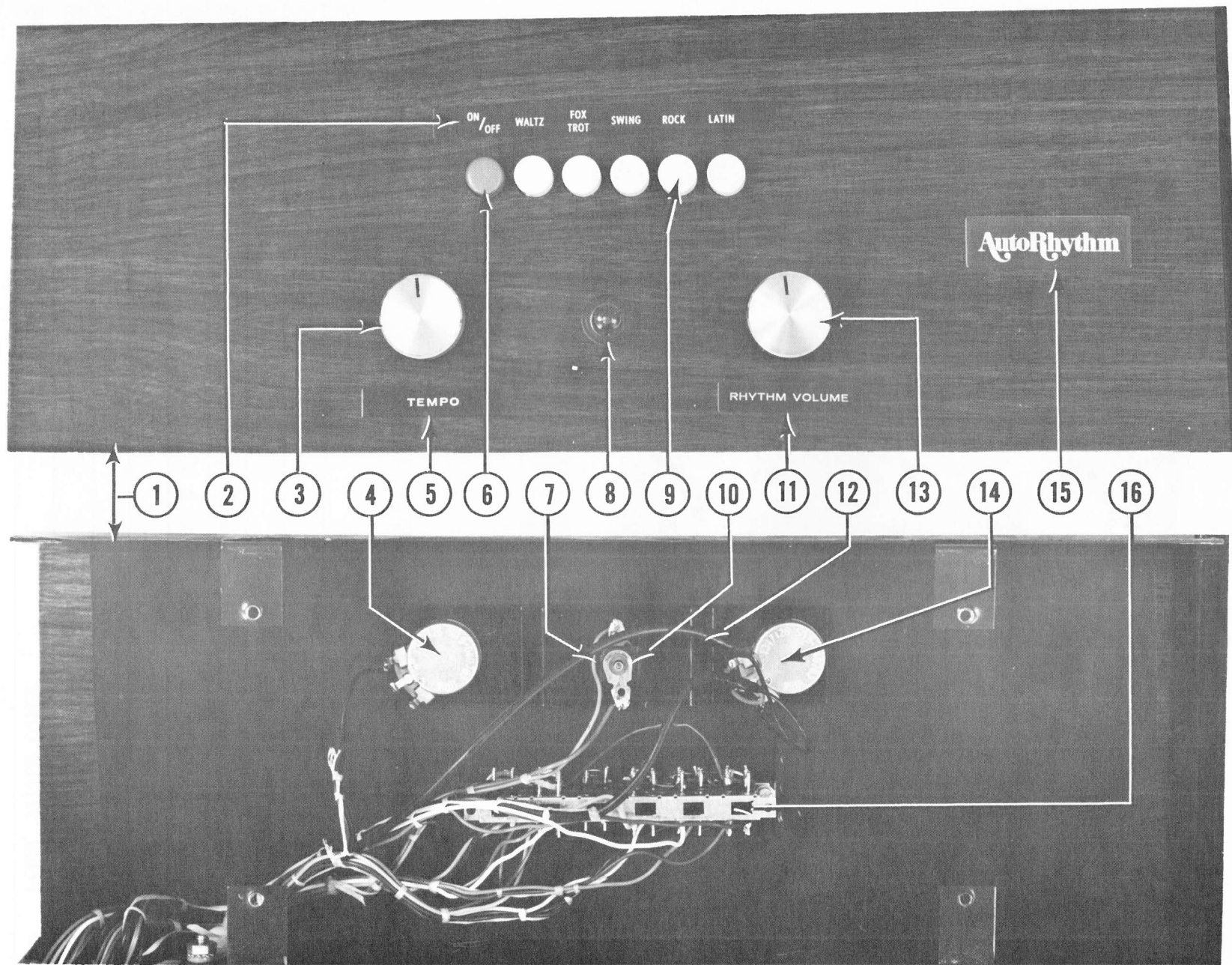


FIG. 22 — 124A & AC SOLO BASS KEYCAP ASSY.

DESCRIPTION FIG. 22

ITEM	DESCRIPTION	PART NUMBER
1	SOLO BASS KEYCAP FINAL ASSY. - 124A & AC	X500-053515
2	NAMEPLATE - AUTO RHYTHM FUNCTIONS	A249-053630
3	TEMPO CONTROL KNOB	A247-052042
4	TEMPO POTENTIOMETER	B509-040783
5	NAMEPLATE - TEMPO	A249-052048
6	PUSH BUTTON - RED	A250-051782
7	TEMPO LAMP SOCKET	A507-047110
8	TEMPO BEAT LIGHT - AMBER JEWEL	A514-047112
9	PUSH BUTTON - WHITE	A250-051780
10	TEMPO BULB	A514-048341
11	NAMEPLATE - RHYTHM VOLUME	A249-052054
12	CONTROL MOUNTING BRACKET	B528-048073
13	RHYTHM VOLUME KNOB	A247-052042
14	RHYTHM VOLUME POTENTIOMETER	B509-040783
15	NAMEPLATE - AUTO RHYTHM	A249-053631
16	AUTO RHYTHM PUSH BUTTON SWITCH ASSY. - 6 STATION	B506-053521

PEDAL CIRCUIT THEORY

Reference: Pedal Switch Schematic: C501-053458
Pedal & Accomp. Filter Schem.: C501-053535
Figures: 19 & 21

The Pedal Switch circuit utilizes wipeout action, which together with the Pedal Trigger Amplifier and frequency divider circuit, provides 13 notes, #13 through #25, for the pedal.

Referring to Pedal Switch Schematic C501-053458, the wipeout switch decks consist of a 13 stage resistive dividing network with a common header output point (junction of R7 and R8). Notes #25 through #37 are supplied from the generators via P1 connector to the pedal keyswitches.

When a pedal key is depressed, signal from the generator is attenuated by the resistor dividing network at the header output point. Attenuation of the signals appearing at the header output point is gradual so that the signal nearest the bass end of the pedalboard will be of the greatest amplitude. The remainder of the notes toward the treble end of the wipeout network will have gradually lower amplitude.

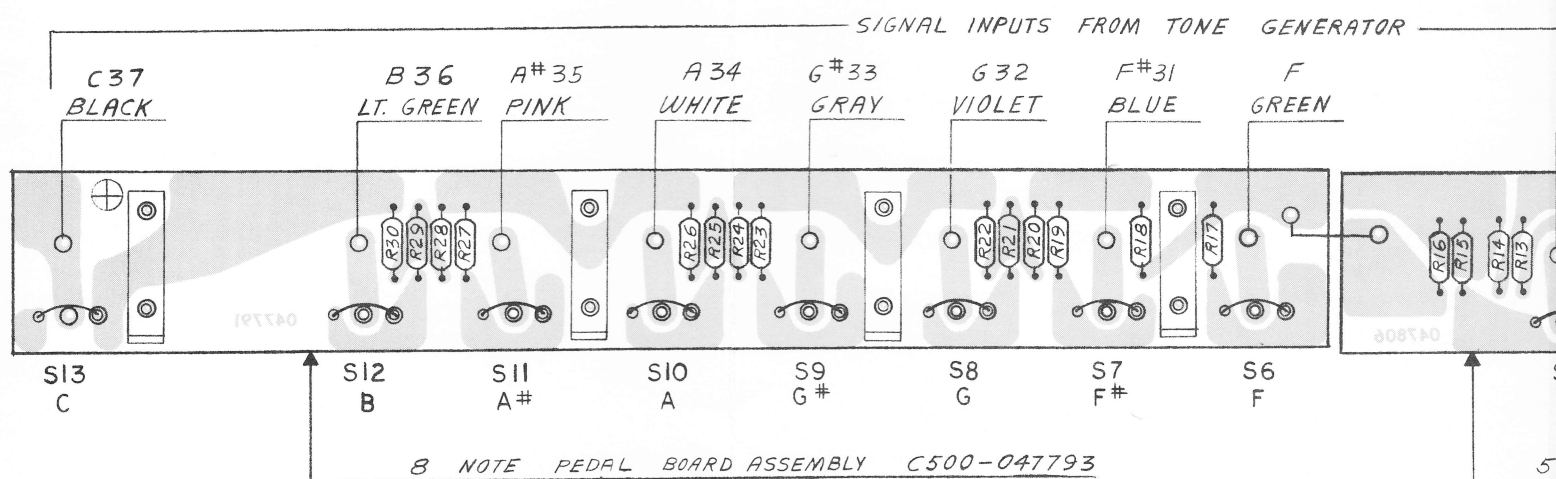
The Pedal header output point is directly connected to the base of Q2 transistor, which is biased in such a way that only the extreme peaks will be applied to the Q1 transistor, where it is amplified and applied to the Pedal divider circuit.

In this case, if two or more pedal keys are depressed, only the note corresponding to the key closest to the bass end will be detected, amplified by Q1, and applied to the divider.

The Pedal divider is located on the two note generator board #1 (C# & D) assembly.

Pedal divider will divide the above input frequency in half, which is then applied to the pedal Bass Filter circuit (schematic C501-053535).

Output of the filter circuit is applied to the pedal filter amplifier Q1, via three pedal tab switches, Bass Soft, Bass Medium, and Bass Full.



TREBLE END

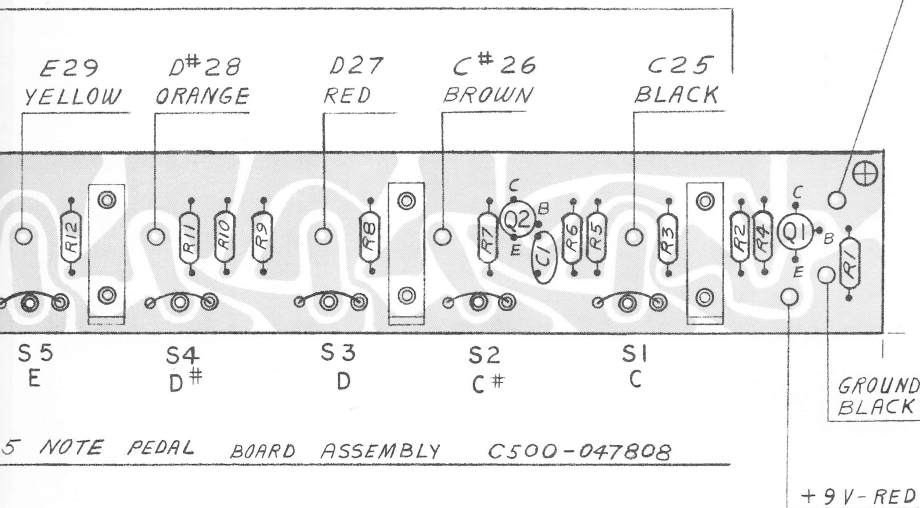
NOTES:

1. REFERENCE SCHEMATICS - PEDAL SWITCH C501-047827
AND GENERATOR D501-047858
2. S.C.S. = SINGLE CONDUCTOR SHIELDED

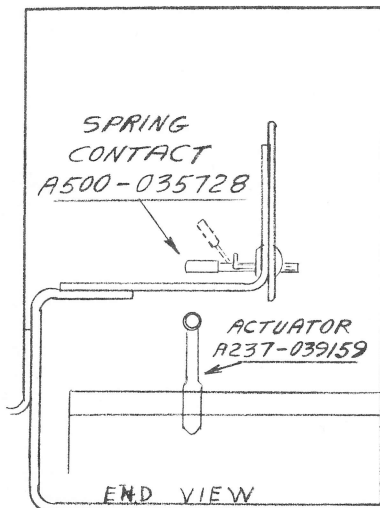
B.V.	D.E.Q.	BOULD.
CIN.	GR.	CON.

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TO PEDAL DIVIDER ON
GENERATOR BD.3, SCS #1



BASS END



DOTTED LINES SHOW
POSITION OF CONTACT
WHEN ACTUATED
(PEDAL DEPRESSED
FULLY). ANGLE SHOULD NOT
EXCEED 45°.

① 3-28-72 CHANGED
5 NOTE BOARD PART N°

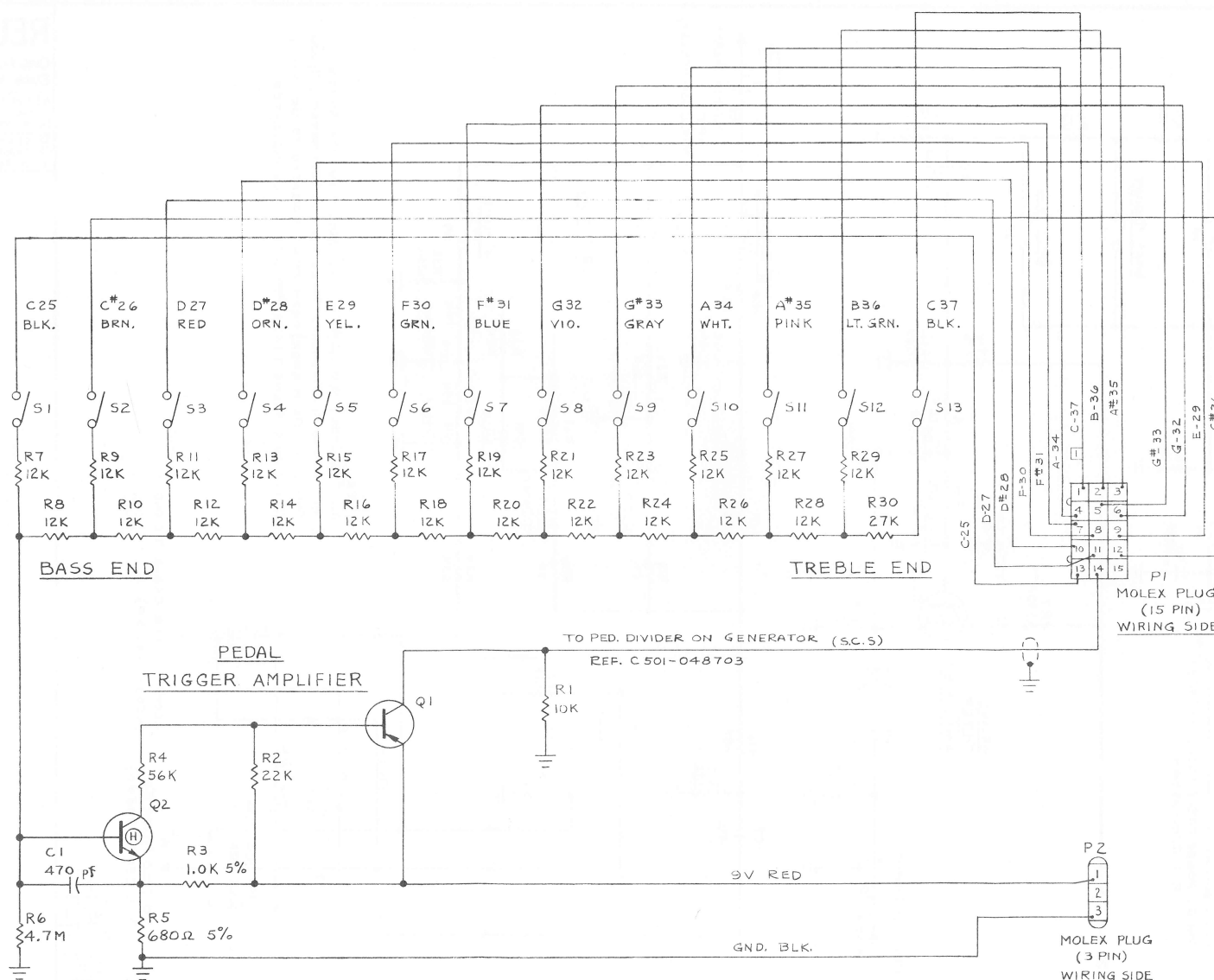
RECORD OF CHANGE

PRINT DISTRIBUTION				DWN. <i>J. H. Kiss</i>	PART NAME	
	B.B.L.			DATE	PEDAL BOARDS - B	
				7-20-70	& 5 NOTE - WIRING DIAGRAM	
	FAY	B.E.I.	CAN.	CH'D.	B/M	GR.
				7-20-70	USED ON	IT.
				APP'D.	MODELS 120, 124A & AC	
				APP'D.	DWN. SCALE	NEXT ASSEM.
				FINISH	REQ.	SUPERSEDES
MAIN THE PROPERTY OF THE D. H. BALDWIN COMPANY AND MUST BE RETURNED AND ARE NOT TO BE DISCLOSED TO ANY PERSONS OTHER THAN THOSE TO WHOM OR OTHER DATA BELONGING TO THE D. H. BALDWIN COMPANY WHICH MAY BE ANY PURPOSE ARE TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN INHER PERSON OR CORPORATION OR CONVEYING ANY RIGHTS OR PERMISSION TO MENTION THAT MAY IN ANY WAY BE RELATED THEREO.				D. H. BALDWIN CO.		REV.
DECIMAL ± .005 FRACTIONAL ± .015				CINCINNATI, OHIO		
ANGLE ± 1/8°				C 579-323		A

RELEASED

Ord. No. R.N. 597

Date 8-5-71



NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS K=1000.
2. ALL RESISTORS ARE $\frac{1}{2}W \pm 10\%$ UNLESS OTHERWISE SPECIFIED.
3. ALL VOLTAGES ARE POSITIVE, MEASURED FROM POINTS INDICATED TO GROUND UNLESS OTHERWISE INDICATED.
4. SELECT NPN TRANSISTORS PER 5429- AS INDICATED.
5. ALL CONNECTIONS THROUGH PEDAL SIGNAL CABLE D508-053455.

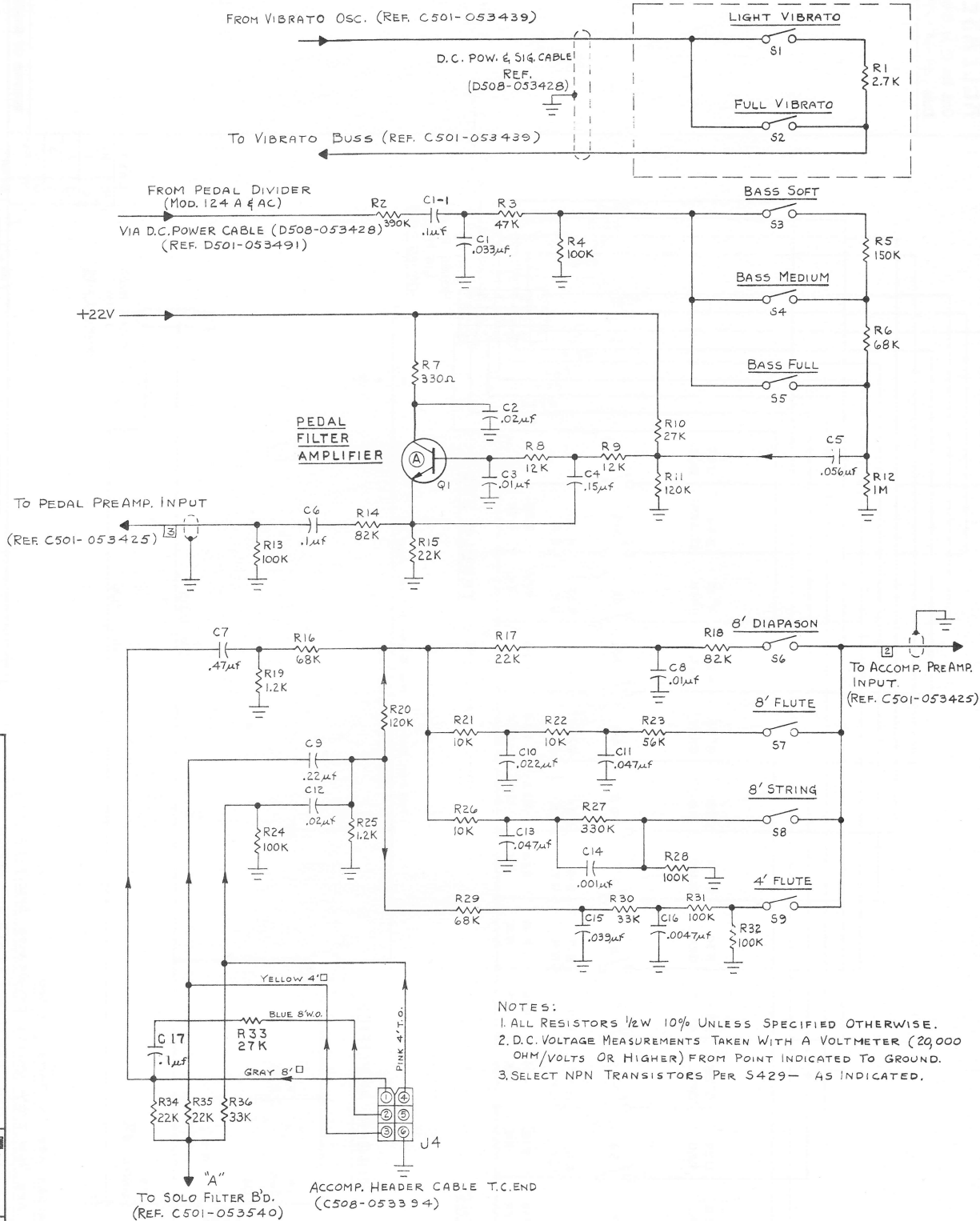
PRINT DISTRIBUTION					
B.V.	D.E.Q.	BOUL.	B.B.L.		
5BL					
CHL	GR.	COR.	FAY	D.E.I.	CAR.
S			5BL 1BR		
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UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:			DECIMAL: .005	FRACTIONAL: $\frac{1}{32}$	ANGLE: $\pm 1^\circ$

DWR. ROBERTS
DATE 7-22-71
CPL. Bk
APP. Rk
FURN. PEB

PART NAME
PEDAL SWITCH SCHEMATIC
S/N 503-
USED OR 124-3
ORGAN MOD. 124H 124AC
NEXT ASSEMBLY
DES. 1
SUPERSEDES

D. H. BALDWIN CO.
CINCINNATI, OHIO

C 501-053458



- NOTES:
1. ALL RESISTORS 1/2W 10% UNLESS SPECIFIED OTHERWISE.
 2. D.C. VOLTAGE MEASUREMENTS TAKEN WITH A VOLT-METER (20,000 OHM/VOLTS OR HIGHER) FROM POINT INDICATED TO GROUND.
 3. SELECT NPN TRANSISTORS PER S429-45 INDICATED.

PART DISTRIBUTION			
S.W.	S.B.L.	MODEL	S.B.L.
ONE	ONE	ONE	ONE
S	S	S	S

DR. ROBERTS	DR. ROBERTS	DR. ROBERTS	DR. ROBERTS
DR. ROBERTS	DR. ROBERTS	DR. ROBERTS	DR. ROBERTS
DR. ROBERTS	DR. ROBERTS	DR. ROBERTS	DR. ROBERTS
DR. ROBERTS	DR. ROBERTS	DR. ROBERTS	DR. ROBERTS

RECORD OF CHANGE			
DATE	BY	REASON	REMARKS
8-11-71	DR. ROBERTS	REVISION	REVISION
8-11-71	DR. ROBERTS	REVISION	REVISION
8-11-71	DR. ROBERTS	REVISION	REVISION

LAST COMP. NO.	USED
R	C
36	17

RELEASED

Ord. No. R.N. 597

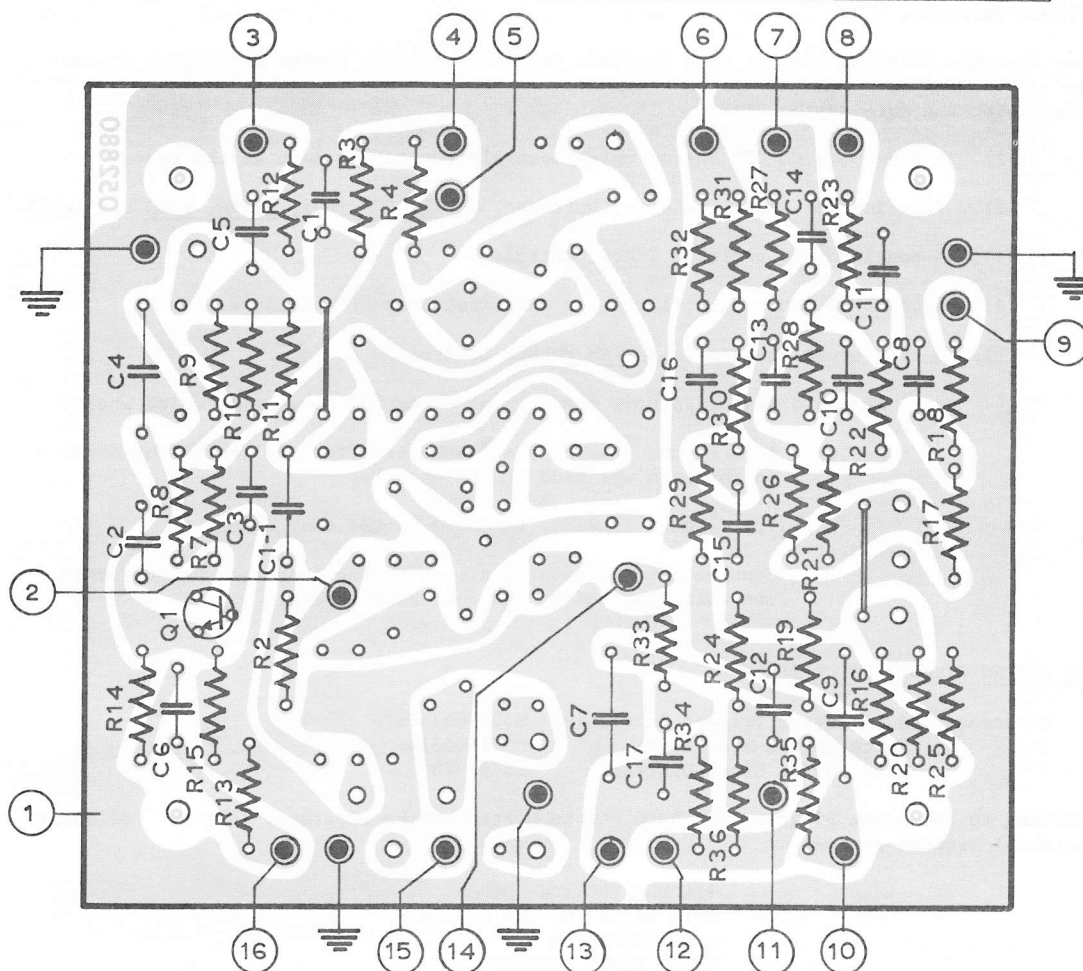
Date 8-20-71

1. ADDED C1=1

2. CHANGED WITHOUT CHANGE NOTICE. W.R.M.

4-10-72

PEDAL AND ACCOMP. FILTER BD. ASSY. (Schematic C501-053535)



ITEM	DESCRIPTION	PART NO./WIRE COLOR
1	PEDAL & ACCOMP. FILTER BD. ASSY.(124A & AC)	B500-053185
2	FROM PEDAL DIVIDER	SNGL. SH. #1
3	FROM PEDAL TAB SWITCH	LT. GREEN
4	TO PEDAL TAB BASS SWITCHES	YELLOW
5	+22VDC	ORANGE
6	TO 4' FLUTE ACCOMP. TAB SWITCH	GREEN
7	TO 8' STRING ACCOMP. TAB SWITCH	RED
8	TO 8' FLUTE ACCOMP. TAB SWITCH	ORANGE
9	TO 8' DIAPASON ACCOMP. TAB SWITCH	BROWN
10	4' <input type="checkbox"/> ACCOMP. HEADER INPUT	YELLOW
11	4' T.O. ACCOMP. HEADER INPUT	PINK
12	"A" HEADER BUCKING VOLTAGE	RED
13	8' <input type="checkbox"/> ACCOMP. HEADER INPUT	GRAY
14	8' W.O. ACCOMP. HEADER INPUT	BLUE
15	+53VDC	WHITE
16	TO PEDAL PREAMP INPUT	SNGL. SH. #3

FIGURE 23

The Baldwin Auto Rhythm is an automatic rhythm system which may be used in any one of five rhythmic patterns.

These rhythmic patterns consist of a rhythmic triggering of the Rhythm Percussion voices.

Controls for the Auto Rhythm are:

- 1). A push-push ON-OFF button which controls the entire Auto Rhythm system.
- 2). The five (5) Rhythm Selector buttons: WALTZ, FOX TROT, SWING, ROCK and LATIN.
- 3). A continuously variable TEMPO control.
- 4). A DOWNBEAT LAMP which flashes on the first beat of a measure.
- 5). A continuously variable RHYTHM VOLUME control.

The Auto Rhythm circuit consists of three (3) assemblies which are:

- a). Auto Rhythm trigger board assembly (located inside the organ on the bass end side of the console).
- b). Voice Board assembly (located in the tone color).
- c). Control head containing all switching functions and variable controls (located on the Solo bass keycap).

AUTO RHYTHM CIRCUIT DESCRIPTION

Reference: Auto Rhythm Trigger Schematic: D501-053601
 Voice Rhythm Schematic: D501-053187
 Auto Rhythm Block Diagram: D579-378

Referring to the Block Diagram, the Auto Rhythm system can be separated into the following functional circuit groups:

+16 VDC VOLTAGE SOURCE
 AUTO RHYTHM ON-OFF CIRCUITS
 RAMP GENERATOR
 TEMPO LIGHT CIRCUIT
 ACCOMPANIMENT RHYTHM TRIGGER GATE
 PEDAL RHYTHM TRIGGER GATE and
 RHYTHM VOICE CIRCUIT

A detailed description of the individual circuit operation will follow with the exception of the Rhythm Voice circuit, which is described under the Rhythm Percussion Theory paragraph.

+16 VDC VOLTAGE SOURCE

The Auto Rhythm Trigger circuit employs two (2) external voltage sources, +50VDC and +22VDC. The internal source of +16VDC is obtained at the emitter of Q1 transistor.

Voltage reference of about +16VDC is established by the resistor divider network R1 and R3 and +22V, which is applied to the base of Q1 transistor. Emitter-base elements of Q1 provide a constant drop of about 0.6VDC so that the emitter will be set to about +16VDC. Emitter current for +16VDC source is supplied from +22V supply via R2 resistor and from the collector of Q1 transistor. As soon as the organ power is switched on, +16VDC source is operative.

AUTO RHYTHM ON-OFF SWITCH FUNCTION

The Auto Rhythm ON-OFF switch, when in "On" position, transfers +22V supply voltage to the Accompaniment (Q2) and Pedal (Q4) Rhythm Trigger gates, to the Ramp On-Off gate (Q18), and to the flip-flop circuit (base of Q8).

Accompaniment Rhythm Trigger gate transistor Q2 is inoperative until its emitter receives +22V supply from the On-Off switch via D3 and R20.

In a similar manner, Pedal Rhythm Trigger Gate transistor Q4 is inoperative until its emitter receives the +22V supply via D9 and R27 from the On-Off switch.

When the On-Off switch is closed, a positive pulse via C4 and R11 is applied to the base of Q8 flip-flop transistor, causing it to saturate. Due to the flip-flop action, Q7 will go out of saturation, creating a positive pulse at its collector, which is applied to the base of Tempo

Light Gate Q6. Transistor Q6 will saturate, creating a negative pulse at its collector, which, via Waltz, normally off contacts and C16 capacitor, energizes the Tempo Light Transient Gate. The Tempo Light will flash, indicating the start of the first Tempo measure. The above action is created in all Rhythm Switch positions except Waltz, which will be explained later.

When the On-Off switch is turned off, a negative pulse will be created and applied to the previously described base of Q8 flip-flop transistor. Q8 will unsaturate and Q7 saturate. This action assures that transistor Q8 is out of saturation when the Rhythm unit is turned off. The above state is necessary to enable the Tempo Light to flash when the On-Off switch is first turned on.

The Ramp Generator is inoperative until the On-Off switch is actuated. Ramp On-Off Gate (Q18) receives a positive voltage via R46 to its base when the On-Off switch is in "On" position - Q18 saturates. With its collector now at the ground potential, the bias from the next stage is removed. Q19 unsaturates and removes the ground potential from the base of Constant Current Generator transistor Q11, allowing the generator to operate. Opposite conditions of the Q18 and Q19 stages will exist while the On-Off switch is in "Off" position.

Tempo Light Gate Q6 and Flip-Flop (Q7-Q8) are not used in Waltz mode. When the Auto Rhythm unit is off, the emitter of Constant Current Generator transistor Q9 is at +16V potential, which, via diodes D7 and D8, fully saturates both Ramp Pulse Gates. Collectors of Q14 and Q17 will be nearly at the ground potential.

When the On-Off switch is depressed, Q9 will go out of saturation; its emitter potential is about +1.5V. Both Ramp Pulse Gates will go out of saturation; their collectors are at +16V potential. #2 Ramp Pulse Gate Q17 collector is capacitively coupled via C5 to the base of Q5, NPN transistor.

Positive reset pulse will saturate Q5, producing a negative pulse in its collector circuit, which, via R15 and the Waltz switch contacts, is applied to the Tempo Light Transient Gate, causing the Tempo Light to flash.

RAMP GENERATOR

The Ramp Generator provides the timing pulses which trigger the Rhythm Percussion Voice Gates. Three pulses are obtained by driving two transistor switches, with differing emitter voltages, into saturation in sequence. A linear ramp voltage is used as a driving source and the slope of the ramp is adjusted by the Tempo control, which determines the measure time, or tempo.

Transistors Q9, Q10, and Q11 make up a constant current generator. This current flows from the emitter of Q9 to linearly charge C14. The value of the current is controlled by the Tempo control (R68), through R37, to determine the slope of the ramp.

With On-Off switch in "Off" position Q19 is saturated. The emitter of Q9 will be approximately +16 volts. When the On-Off switch is actuated, Q19 is turned off and emitter of Q9 will drop to about +1.5VDC, and then begin to rise linearly as C14 charges. This negative-going voltage drop produces Pulse #1.

As ramp voltage rises, Q17 and Q14 will turn on in sequence due to their increasing base currents through D7, D8, R48 and R50.

Q17 produces negative-going Pulse #2 at its collector as it turns on, while Q14 produces Pulse #3.

The reset voltage is established at the junction of R36, R56 and R39, and will be about +10V for the Waltz and +5V for all other rhythms. When the ramp voltage reaches the value of the reset voltage plus the voltage drop across the two diodes (D7 and D8), transistors Q12 and Q13 will turn on, rapidly discharging C14.

During the discharge of C14, Q11 turns on, turning Q10 on, which clamps the base of Q9 to ground and prevents Q9 from supplying charging current during the discharge cycle. When C14 has been completely discharged, Q12 and Q13 will turn off; Q9 will turn on and the charging cycle repeats.

Reset and reference voltages for the emitters of Q17 and Q14 are established by the resistor divider chain R36, R56, R57, R59, R60 and R61.

Auto Rhythm Theory (Cont'd.)

The reference voltages for Q17 and Q14 are coupled through Q16 and Q15, which provide regenerative feedback, causing Q17 and Q14 to have a fast switching time.

As the ramp voltage drops (during discharge), Q17 and Q14 rapidly turn off. The resulting positive rise at the collector of Q17 is coupled to the base of Q5 and C5, pulsing Q5 on, causing a negative pulse to appear at the collector of Q5. This is coupled through C1 to the Flip-Flop, causing it to change state each time the ramp resets.

Pulse #1 from the emitter of Q9 is always connected to the Pedal Trigger Gate Q4, via C11, R33 and D5. Pulse #2 from the collector of Q17 is always connected to the Accompaniment Trigger Gate via R16, C6 and D1.

Pulses #2 and #3 connect through the rhythm selector switches to the appropriate Accompaniment and/or Pedal gates for the selected rhythm.

Pulse #3 is inhibited from the pedal gate on the first ramp, and every other ramp thereafter, in the Rock and Latin rhythms. Pulse #3 is connected by the Rock and Latin rhythm switches via R34, C13, D4 and C12 to the Pedal Trigger Gate Q4. The junction of C12 and R34 is connected to the collector of Q6 when these rhythms are used. Q6 will be saturated by the positive voltage from Q7 via R12, thus grounding the junction of C12-R34 during the first ramp cycle.

When the ramp resets, Q14 and Q17 turn off. The resulting positive pulse (from the collector of Q17) is applied by C5 to Q5, resulting in a negative pulse at its collector which is always coupled by C4 to the Flip-Flop. Therefore, every time the ramp resets, the Flip-Flop will change state.

The positive saturation voltage for Q6 is then clamped to ground on the second ramp cycle, and every other ramp cycle thereafter. Therefore, the junction of C12-R34 is removed from ground and Pulse #3 will then actuate the Pedal Trigger Gate (every second ramp cycle).

When Accompaniment Trigger Gate Q2 is pulsed on by the ramp, the positive voltage appearing at its collector pulses Q3 on via R19, creating negative-going pulses which are coupled by C3 to the organ Accompaniment Rhythm Percussion trigger amplifier circuit.

When Pedal Trigger Gate Q4 is pulsed on by the ramp, the positive voltage appearing at its collector is coupled by C10 to the organ Pedal Rhythm Percussion trigger amplifier circuit.

TEMPO LIGHT

The Tempo Light is operated by Q21, the driver, and Q20, the Tempo Light Transient Gate. Application of a negative pulse to the base of Q20 allows the positive emitter voltage to appear at its collector momentarily. The collector of Q20 applies this voltage through R65 to the base of Q21, pulsing it on, completing the circuit from the +50 volt supply, R67, R62, and Q21 to ground, causing the light to flash momentarily.

In the Waltz rhythm one ramp cycle establishes a complete measure, therefore, the lamp must flash once each ramp (measure).

When the ramp resets, a positive pulse appearing at the collector of Q17 is applied via C5, to the base of Q5, causing it to saturate, developing a negative pulse at its collector. The Waltz switch (when depressed) couples this pulse via R15 and C16 to the Tempo Light circuitry.

PEDAL RHYTHM TRIGGER GATE

The Pedal Rhythm Trigger Gate (transistor Q4) is inoperative until the positive voltage is supplied to its emitter from the On-Off switch contacts, when in "On" position, via D9 and R27. Application of a negative Ramp Pulse to the base of Q4 allows the positive emitter voltage to appear at its collector momentarily. The collector applies this positive pulse via C10 to the Pedal Trigger Amplifier circuit Q10 and Q11, which triggers the Pedal Rhythm Percussion voices in the organ.

The Pedal Rhythm Trigger Gate input circuit is always connected to the Ramp Pulse #1 via D5, R33 and C11. Pulse #2 is applied by the Swing Rhythm switch and Pulse #3 by the Rock or Latin Rhythm switches via C13, R34, C12 and D4. As previously described, Pulse #3 is inhibited from the pedal gate on the first ramp, and every second ramp thereafter by the conduction of Q6 transistor. Pedal Rhythm Trigger Gate output positive pulse is in the order of 9 to 20 ms long.

ACCOMPANIMENT RHYTHM TRIGGER GATE

Accompaniment Rhythm Trigger Gate (transistors Q2 and Q3) is operative when the On-Off switch is depressed to supply the +22V to the emitter of Q2 via D3 and R20.

Ramp Pulse #2 is always connected to the base of Q2 via D1, R16, and C6. Pulse #3 is applied by the Waltz or Latin Rhythm switches via R18, C7 and D2.

Ramp Pulse #1 is not applied to the Accompaniment Rhythm Trigger Gate.

When the negative pulse is applied to the base of Q2, the positive emitter voltage will appear at its collector momentarily, which saturates Q3.

The resulting negative pulse (from the collector of Q3) is applied by C3 to the Accompaniment Trigger Amplifier (Q8, Voice Rhythm Schematic) which triggers the Accompaniment Rhythm Percussion voices in the organ. Accompaniment Rhythm Trigger Gate produces a negative pulse of approximately 1.5 ms long.

For the description of the Trigger Amplifier and other Rhythm Percussion circuitry, refer to the Rhythm Percussion paragraph.

For Rhythm Pattern Chart information refer to Voice Rhythm Schematic D501-053187.

AUTO-RHYTHM TRIGGER BOARD ASSY. C500-053634

Schematic D501-053601

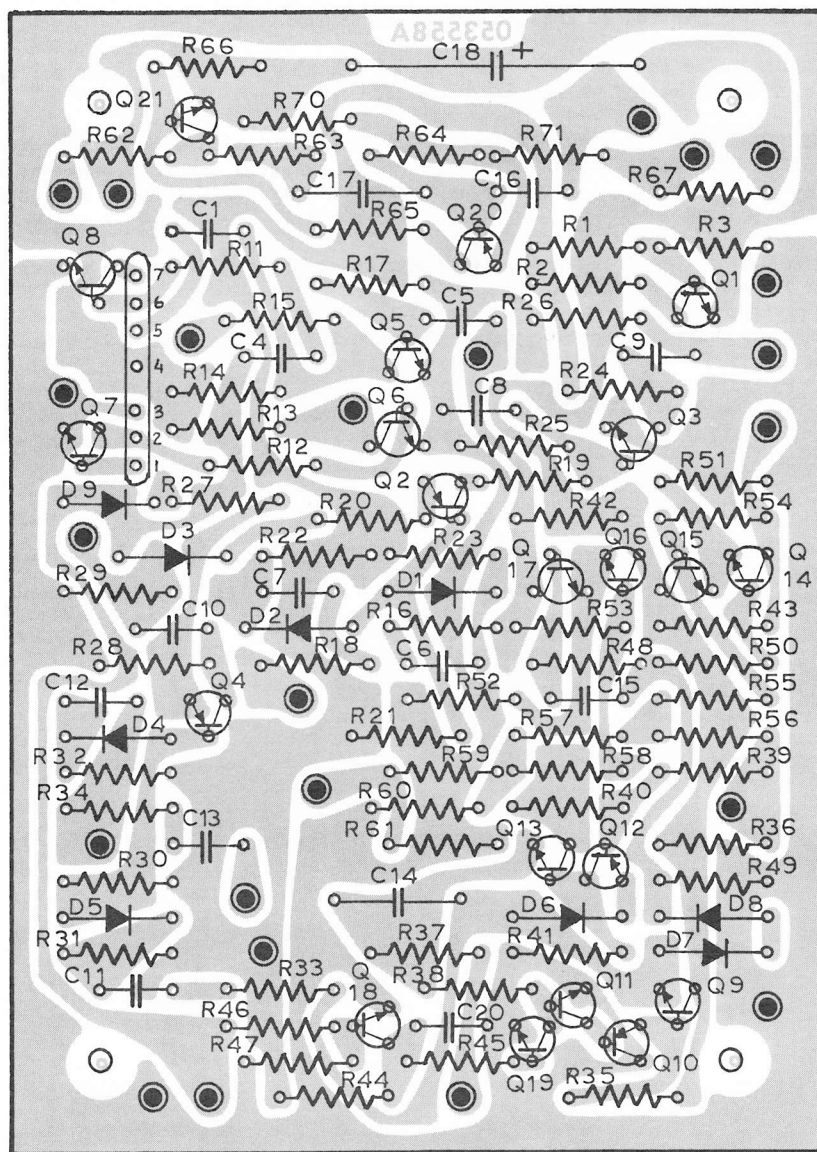
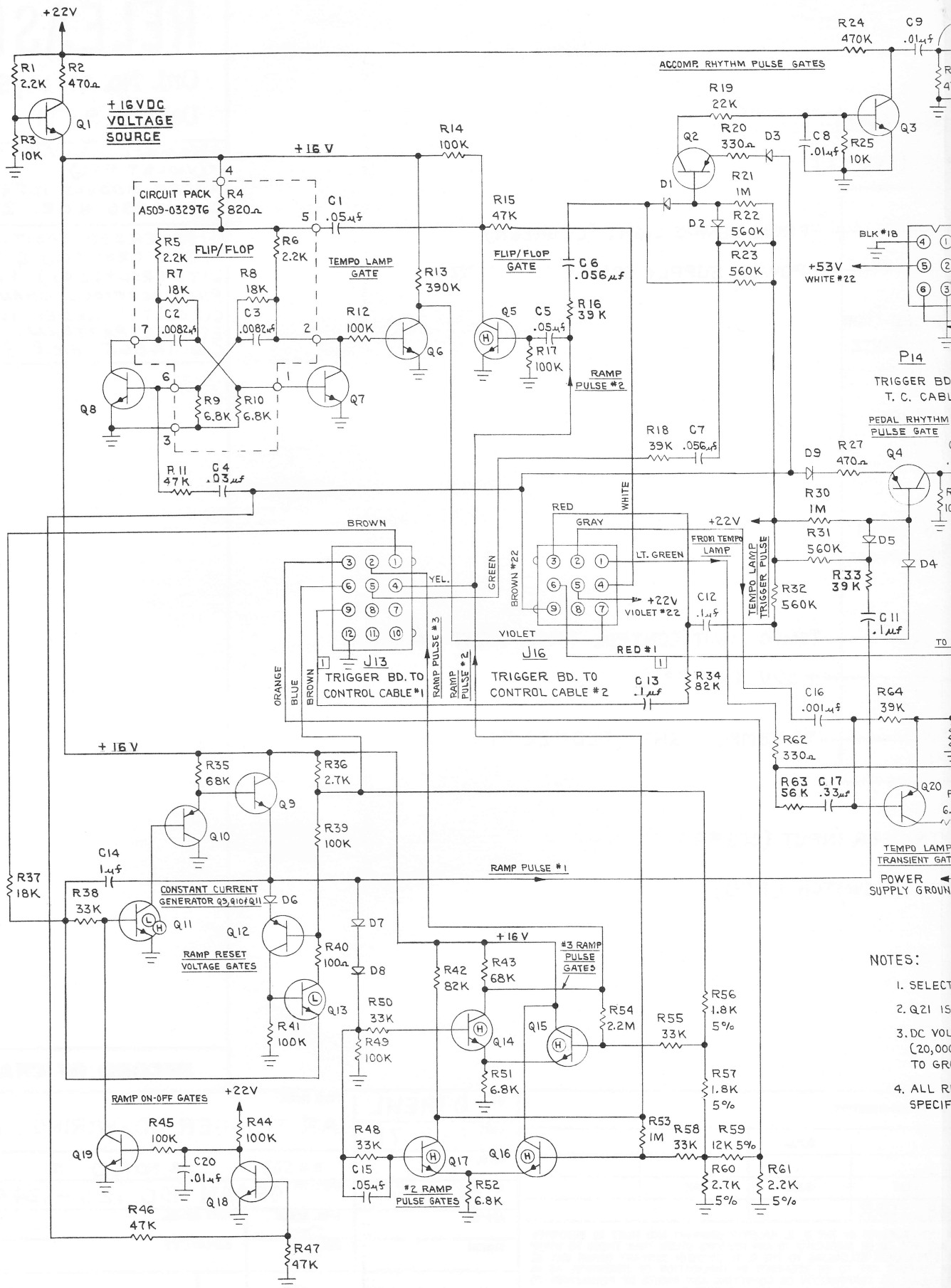


FIGURE 24



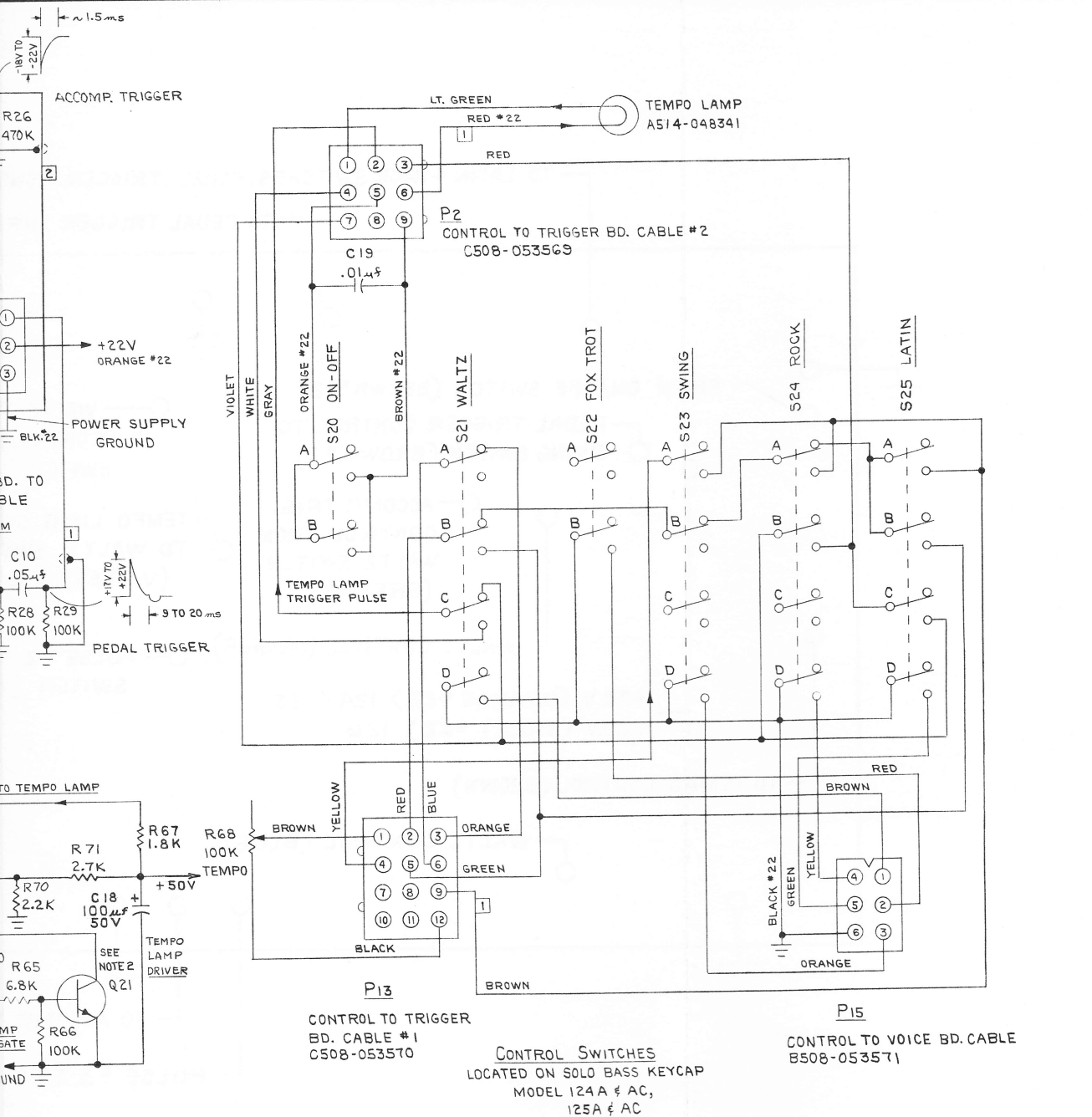
NOTES:

1. SELECT
2. Q21 IS
3. DC VOL (20,000 TO GR
4. ALL R SPECIF

RELEASED

Ord. No. RN 597
Date 8-23-71

- (A) ADDED CABLE PART NOS.
CN 14, 683 D.D. 10-25-71
- (B) ADDED R70 - 2.2K -
ADDED R71 - 2.7K -
R67 WAS 560Ω
C.N. 14865 H.C.R. 3-6-72
- (C) CHANGED WITHOUT
CHANGE NOTICE
4-10-72 W.R.M.

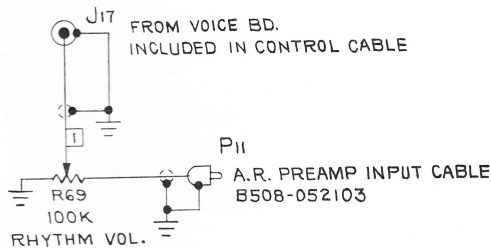


ECT NPN TRANSISTORS PER S429 - AS INDICATED.

IS A514-047828.

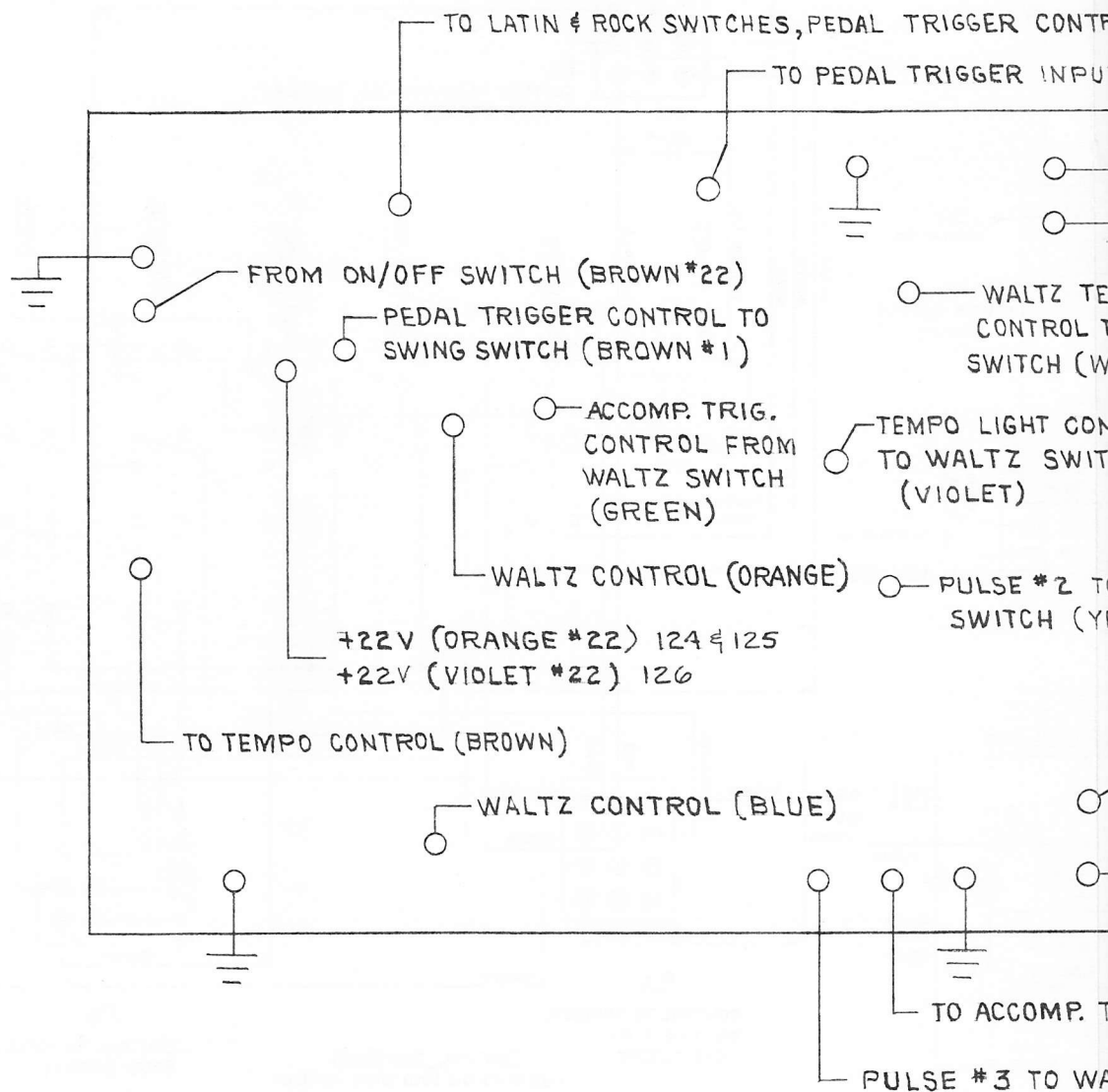
VOLTAGE MEASUREMENTS TAKEN WITH A VOLTMETER
(1000 OHM/VOLT OR HIGHER) FROM POINT INDICATED
GROUND.

RESISTORS ARE 1/2W 10% UNLESS OTHERWISE
SPECIFIED.



RECORD OF CHANGE

PART DISTRIBUTION						PART NAME	
S.T.	S.E.A.	DOHA	S.E.L.			A.R. TRIGGER SCHEMATIC	
	5BL					8-20-71	
ORL	OL	ORL	INT	S.E.L.	ORL	b/c 124-125 OR NOTE II.	
LAST USED						USED ON MOD. 124A & 125A & AC.	
S						Pak.	
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UNLESS OTHERWISE SPECIFIED TO EXTERMINATE ARE:						REMARKS	
DECIMAL ± 1/16"						FRACTIONAL ± 1/16"	
D. H. BALDWIN CO.						D 501-053601	
CINCINNATI, OHIO						C	



PR			
B.V.	D.E.Q.	BOULD.	
	3 BL		
CIN.	GR.	CON.	
FILE			4
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UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:			

RELEASED

Ord. No. CN 14,598

Date 8-9-71

A) CHANGED +21V TO +22V
(VIOLET #22)
ADDED MODELS 125 & 126 INFO.
C.N. 14836 H.C.R. 2-11-72

B) REVERSED POSITIONS OF
+50V (RED #22) & TEMPO
LITE (RED #22 #1) PINS.
PIN LOCATIONS CHANGED @
CIRCUIT CHANGES IN
ETCHED PATTERN.
C.N. 14865 H.C.R. 3-6-72

CONTROL (RED)

OUT (SCS #1)

FROM TEMPO LIGHT (LT. GREEN)

POWER SUPPLY GROUND (BLACK #22)

TEMPO LIGHT

TO WALTZ

(WHITE)

CONTROL

ITCH

TO SWING

(YELLOW)

TEMPO LIGHT CONTROL FROM LIGHT SW. (GRAY)

+50V (RED #22)

TO TEMPO LIGHT (RED #22 #1)

TRIGGER INPUT (SCS #2)

WALTZ SWITCH (RED)

RECORD OF CHANGE

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FAY	B.E.I.	CAN.	
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PERSON OR CORPORATION OR CONVEYING ANY RIGHTS OR PERMISSION TO
ON THAT MAY IN ANY WAY BE RELATED THERETO.

DECIMAL $\pm .005$
FRACTIONAL $\pm .015$

ANGLE $\pm \frac{1}{2}^\circ$

DWN. D.DIEHL

DATE 8-9-71

CH'D. DMS

APP'D. DMS

APP'D.

FINISH

PART NAME

AR TRIGGER BD.-WIRING DIAGRAM

B/M 503

GR. NOTED IT.

USED ON ORGAN MOD. 126-124A & AC

DWN. SCALE

NEXT ASSEM.

125

REQ.

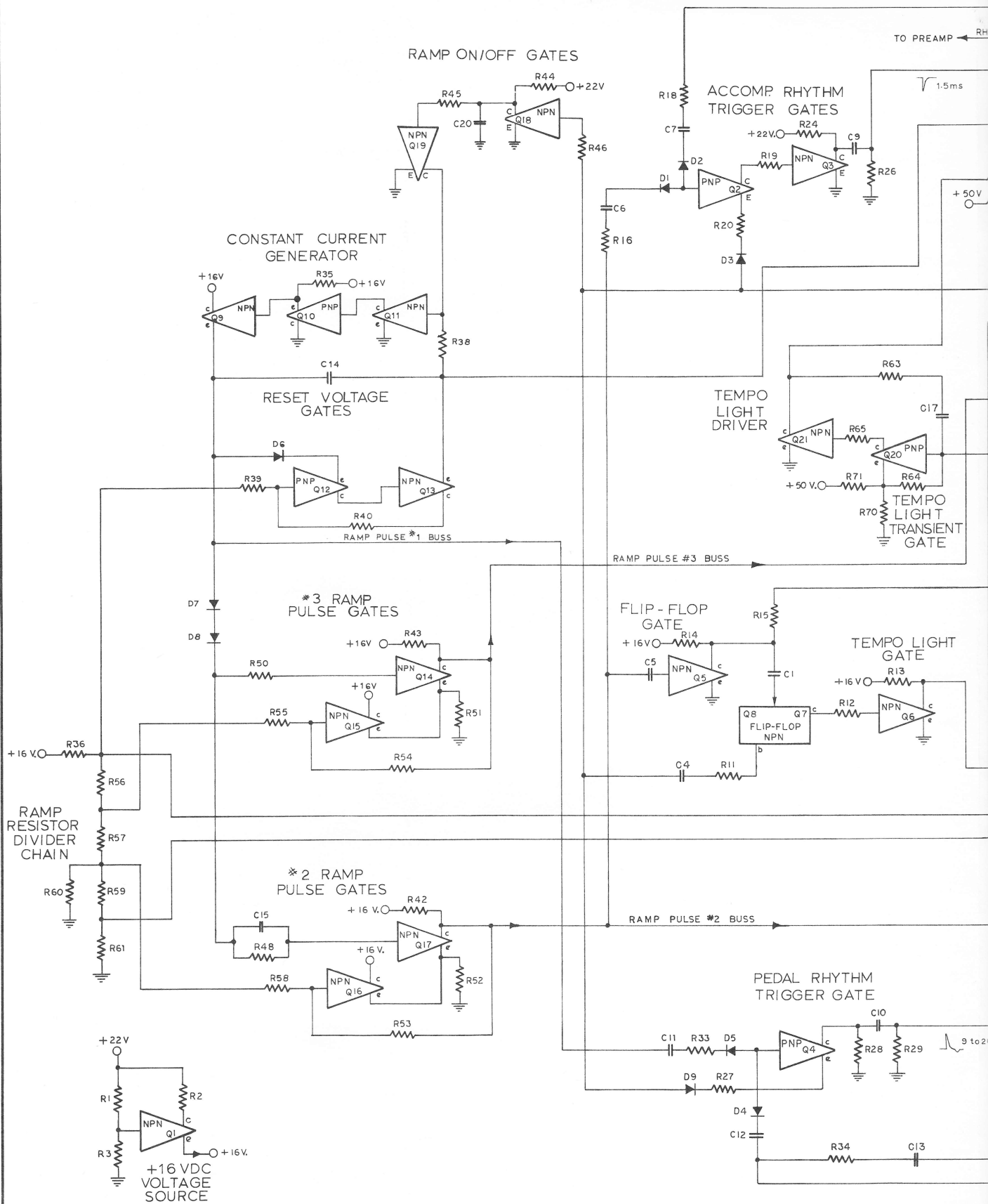
SUPERSEDES

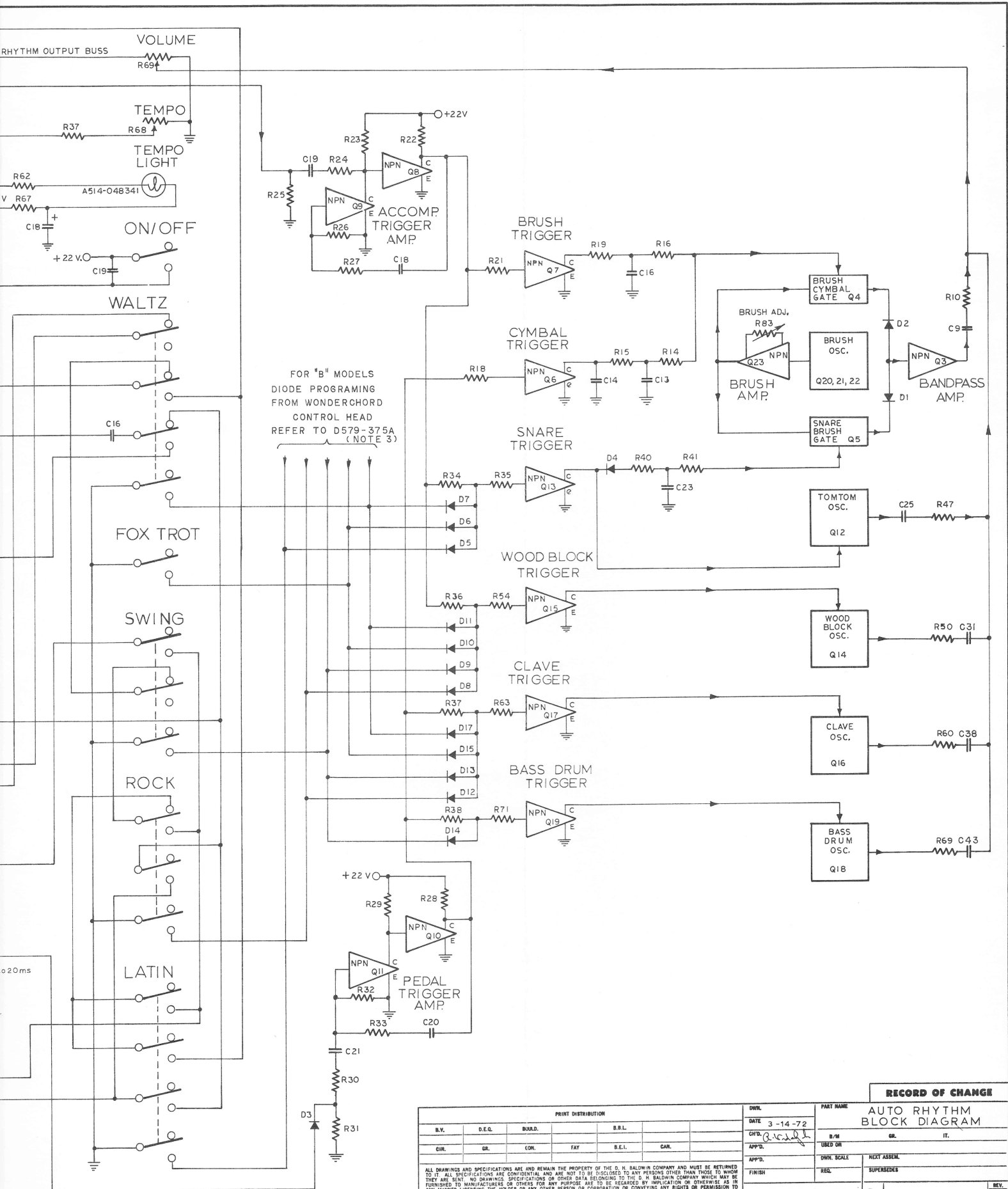
D. H. BALDWIN CO.
CINCINNATI, OHIO

B 501-053561

REV.

B





RECORD OF CHANGE

AUTO RHYTHM BLOCK DIAGRAM

DATE	3-14-72	BY	GR	IT
CHD		USED ON		
APP'D		OWN. SCALE	NEXT ASSEM.	
FINISH		REL.	SUPERSIDES	
D. H. BALDWIN CO.	CINCINNATI, OHIO	D	579-378	REV.

PRINT DISTRIBUTION					
B.Y.	D.E.G.	BUOLD.	B.B.L.		
GR.	GR.	CON.	FAY	B.E.L.	CAR.

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UNLESS OTHERWISE SPECIFIED
TOLERANCES ARE:

DECIMAL ± .005
FRACTIONAL ± .015

ANGLE ± 16°

MODEL 124B - GENERAL INFORMATION

The Model 124B is the organ equipped with the WonderChord feature.

The 124B section contains the following information:

1). The WonderChord Circuit.

The WonderChord Auto Rhythm circuit is used in conjunction with the Rhythm Voice Generation circuit. Rhythm Voice Generation Circuit is common to 124 series.

2). The Pedal Sustain and Pedal Filter circuitry.

3). Muted Reed Circuitry.

4). The Accessory Board assembly includes the cassette regulated supply components necessary for cassette field installation.

Accessory Board information is given in the 124 series section of this manual.

For description of other 124B circuitry, refer to the 124 series section.



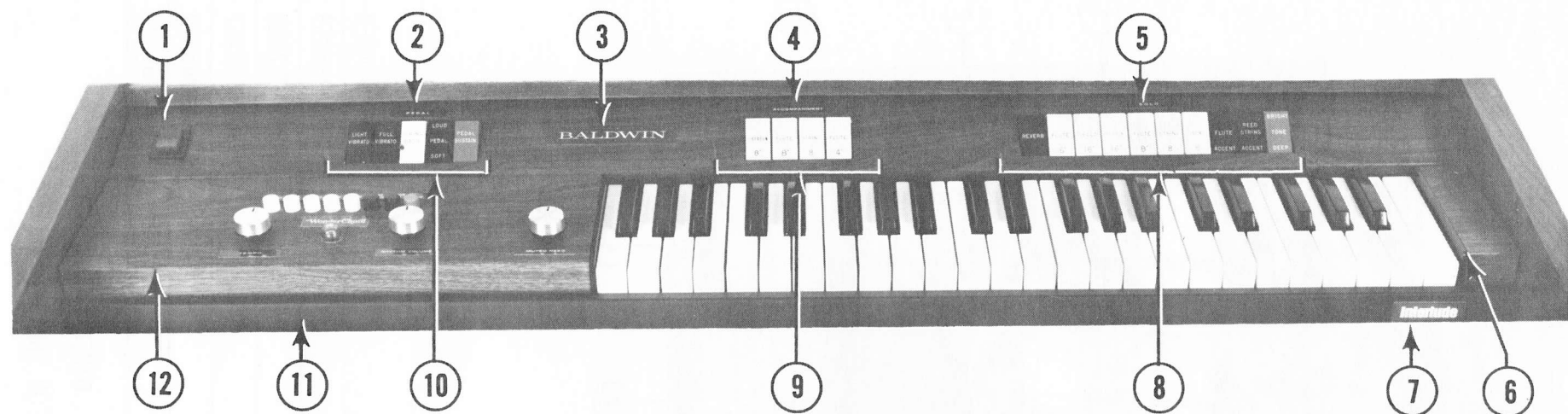


FIG. 26 - 124B & BC TONE COLOR STOP TABLETS

ITEM	DESCRIPTION	PART NUMBER
1	POWER SWITCH	B506-052168
2	NAMEPLATE - PEDAL	A249-052050
3	NAMEPLATE - BALDWIN	A249-052192
4	NAMEPLATE - ACCOMPANIMENT	A249-052051
5	NAMEPLATE - SOLO	A249-052052
6	SOLO TREBLE KEYCAP	X500-052474
7	NAMEPLATE - INTERLUDE	A249-053652
8	SOLO FILTER STOP TABS	SEE PART LIST
9	ACCOMPANIMENT FILTER STOP TABS	SEE PART LIST
10	VIBRATO & PEDAL FILTER STOP TABS	SEE PART LIST
11	KEYSLIP - SOLO	C528-053096
12	SOLO BASS KEYCAP FINAL ASSY. - 124B & BC	X500-053199

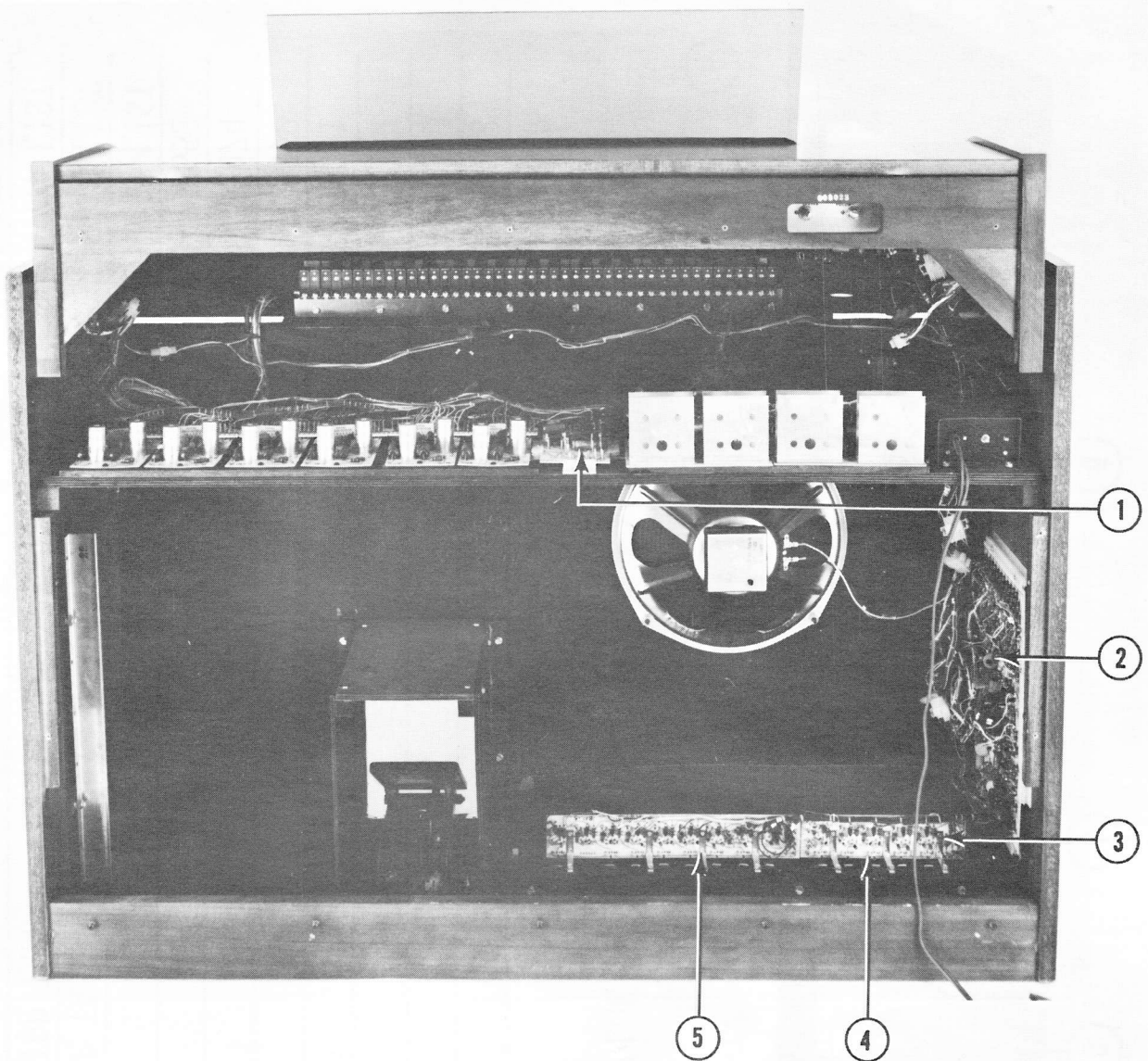


FIG. 27 - 124B & BC ORGAN BACK VIEW

ITEM	DESCRIPTION	PART NUMBER
1	ACCESSORY BOARD ASSY. - 124AC, B & BC	B500-053253
2	WONDERCHORD #2 BOARD ASSY.	C500-052888
3	13 NOTE PEDAL ASSY. - 124B & BC	D500-053267
4	5 NOTE PEDAL SUSTAIN BOARD ASSY.	C506-048860
5	8 NOTE PEDAL SUSTAIN BOARD ASSY.	C506-048866

NOTE: ABOVE PARTS ARE USED ON 124B & BC ORGANS ONLY. OTHER PARTS ARE USED ON ALL 124 ORGAN TYPES, REFER TO FIG. 19 FOR THEIR PART NUMBERS.

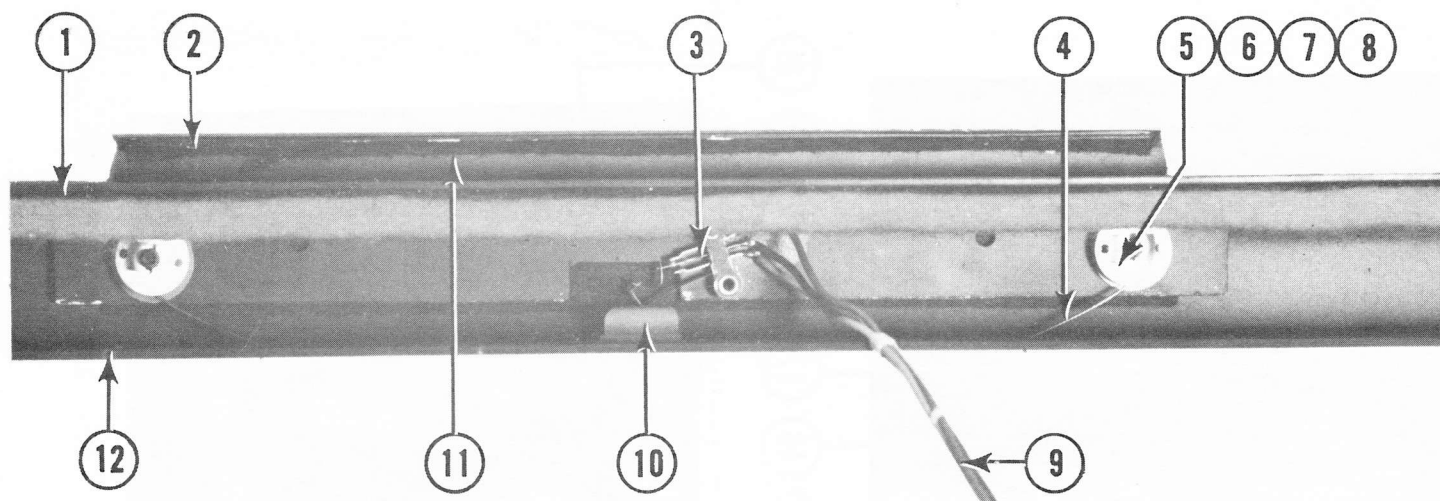


FIG.28 — MAJOR / MINOR TOUCH BAR ASSY.

ITEM	DESCRIPTION	PART NUMBER
1	ACCOMP. KEYSLIP WELDED	D500-053157
2	ACTUATOR BAR - RIVETED	B500-052666
3	MICROSWITCH	A506-052616
4	ACTUATOR DETENT	A237-052680
5	SPEEDNUT	A247-052681
6	NUT - NYLOK (6-32)	A247-028484
7	NYLON WASHER	A244-045932
8	FELT GASKET	A244-052672
9	TOUCH BAR CABLE	B508-052454
10	RUBBER BUMPER	A244-040842
11	FELT MAROON (7-3/16")	A244-006211
12	ACCOMP. KEYSLIP FINAL ASSY.	C500-053176

DESCRIPTION FIG. 29

ITEM	DESCRIPTION	PART NUMBER
1	SOLO BASS KEYCAP FINAL ASSY.	X500-053199
2	PUSH BUTTON SWITCH ASSY. - 8 STATION	B506-052775
3	NAMEPLATE - WONDERCHORD FUNCTIONS	A249-052400
4	TEMPO CONTROL KNOB	A247-052042
5	TEMPO POTENTIOMETER (100K OHMS)	B509-040783
6	NAMEPLATE - TEMPO	A249-052048
7	CONTROL MOUNTING BRACKET	B528-048073
8	PUSH BUTTON - WHITE	A250-051780
9	TEMPO BULB	A514-048341
10	TEMPO BEAT LIGHT - AMBER JEWEL	A514-047112
11	TEMPO LIGHT SOCKET	A507-047110
12	NAMEPLATE - WONDERCHORD	A249-052802
13	PUSH BUTTON - BLACK	A250-051781
14	NAMEPLATE - RHYTHM VOLUME	A249-052054
15	RHYTHM VOLUME POTENTIOMETER (100K OHMS)	B509-040783
16	RHYTHM VOLUME CONTROL KNOB	A247-052042
17	PUSH BUTTON - RED	A250-051782
18	MUTED REED CONTROL KNOB	A247-052042
19	MUTED REED POTENTIOMETER (100K OHMS REV. AUDIO)	B509-039731
20	NAMEPLATE - MUTED REED	A249-053882
21	POT MOUNTING BRACKET	A528-052750

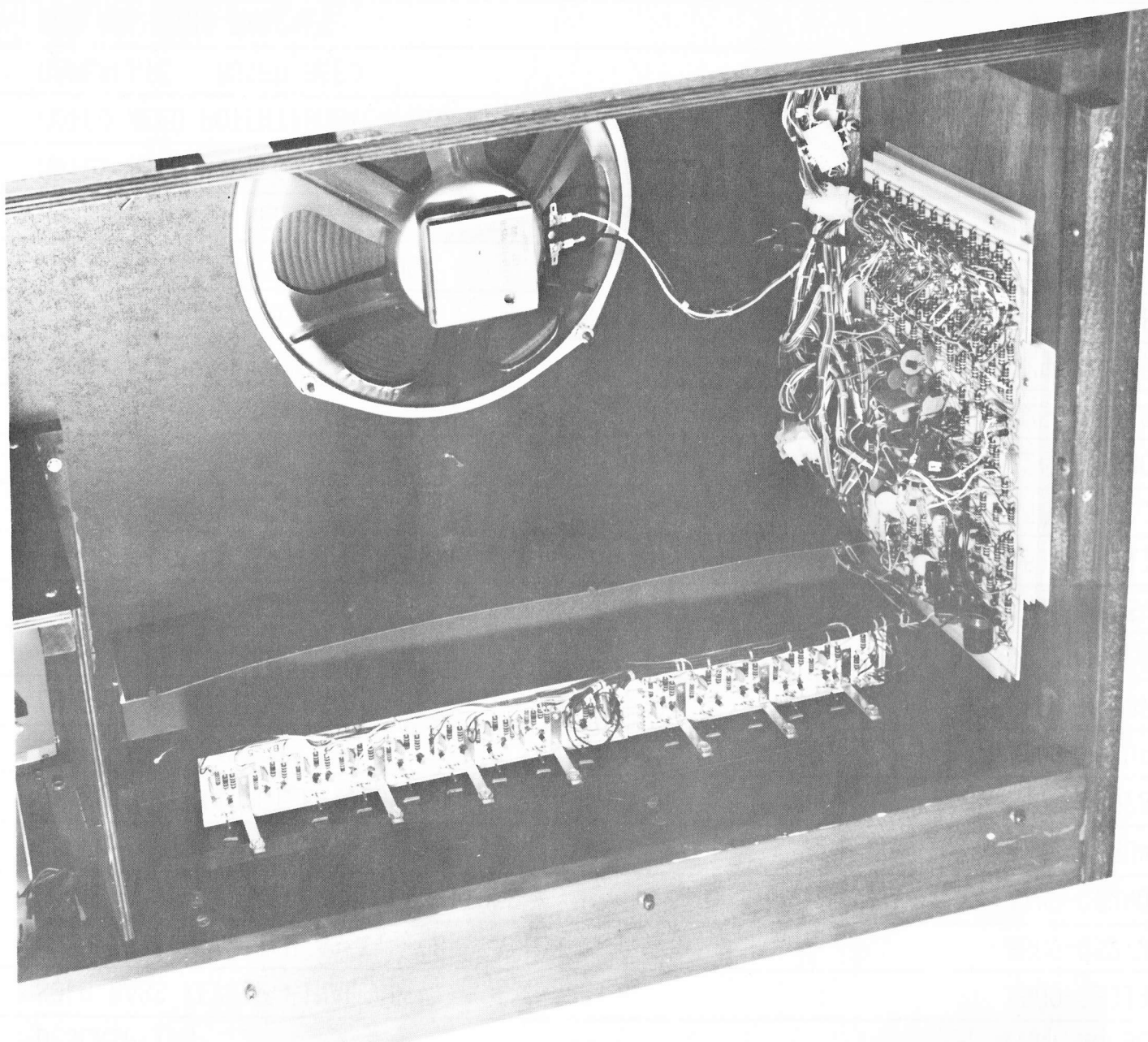
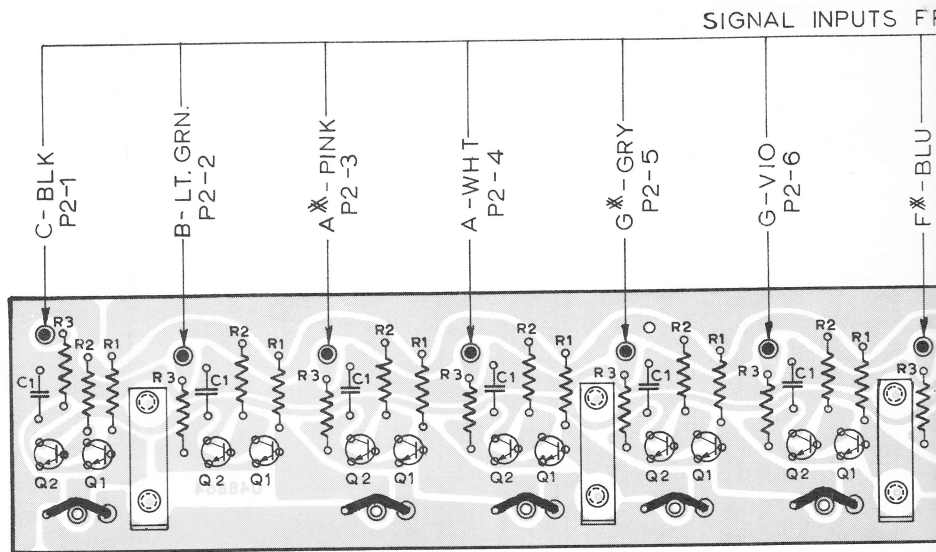
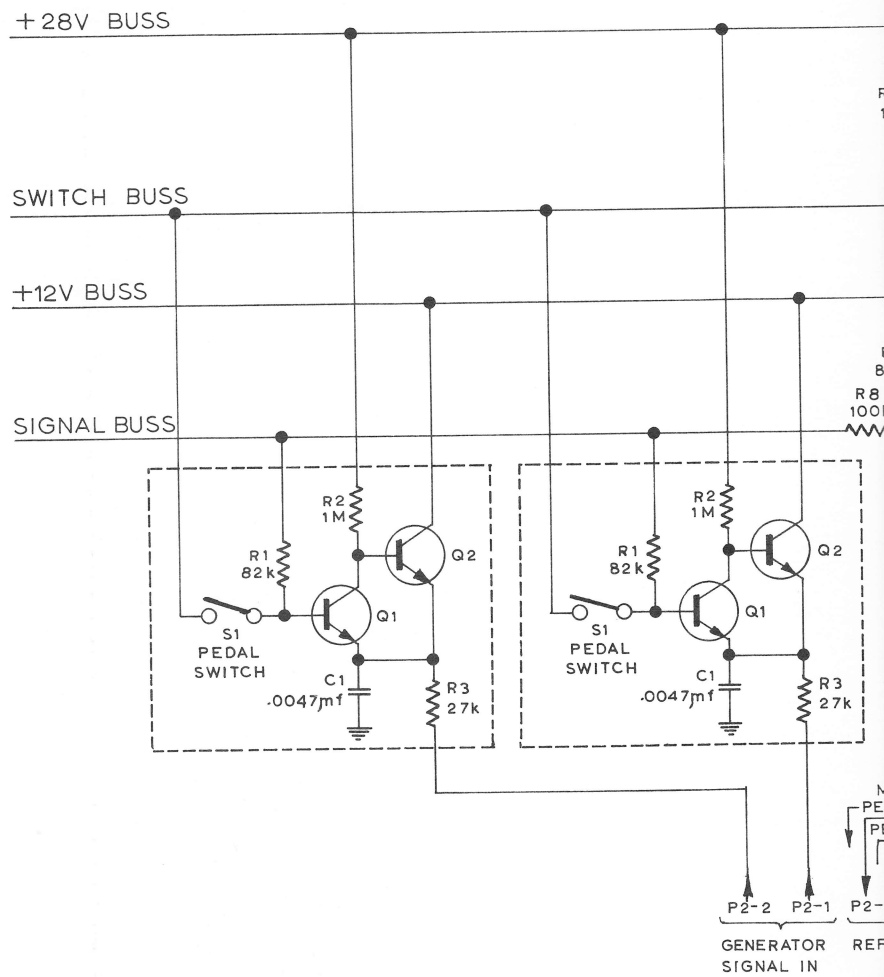


FIG. 30 — WONDERCHORD AND PEDAL SUSTAIN BOARDS

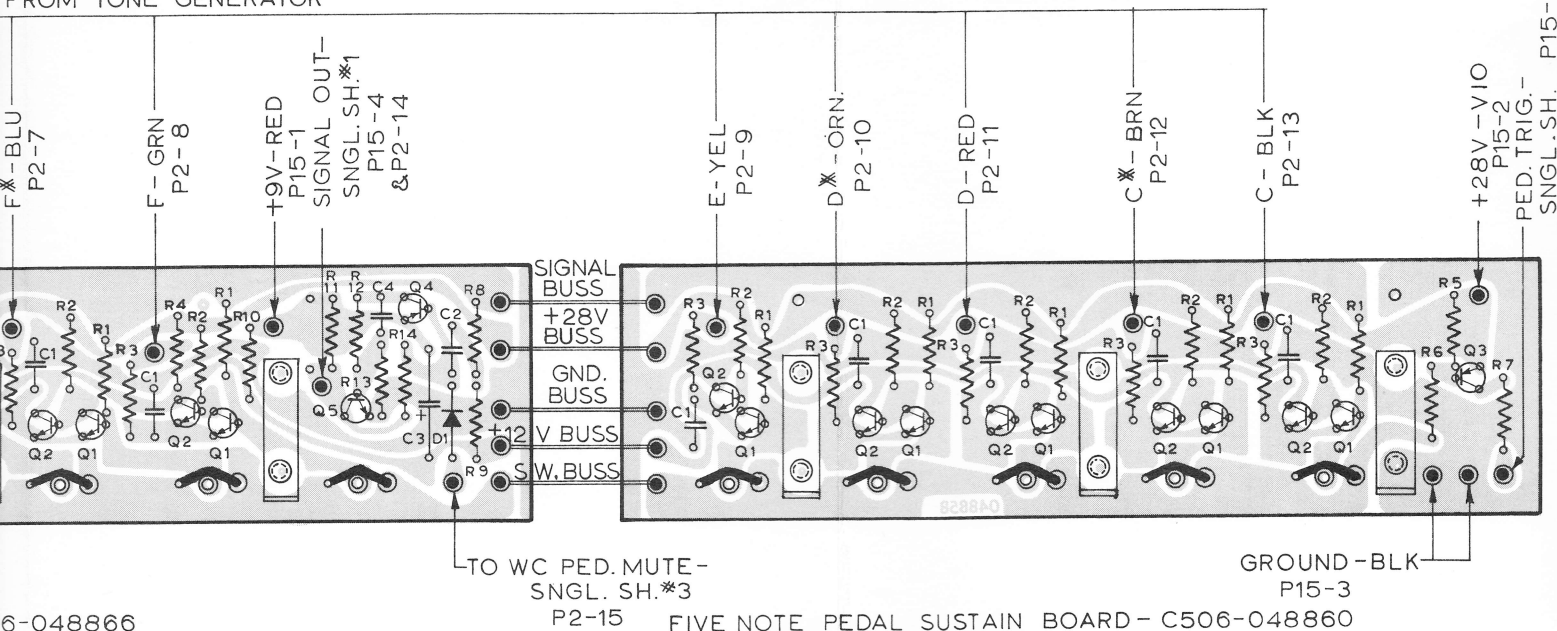


EIGHT NOTE PEDAL SUSTAIN BOARD- C506

NOTE: LATCH CIRCUITS B THRU F ARE OFFSET TO LEFT OF THEIR RESPECTIVE SWITCHES.



FROM TONE GENERATOR



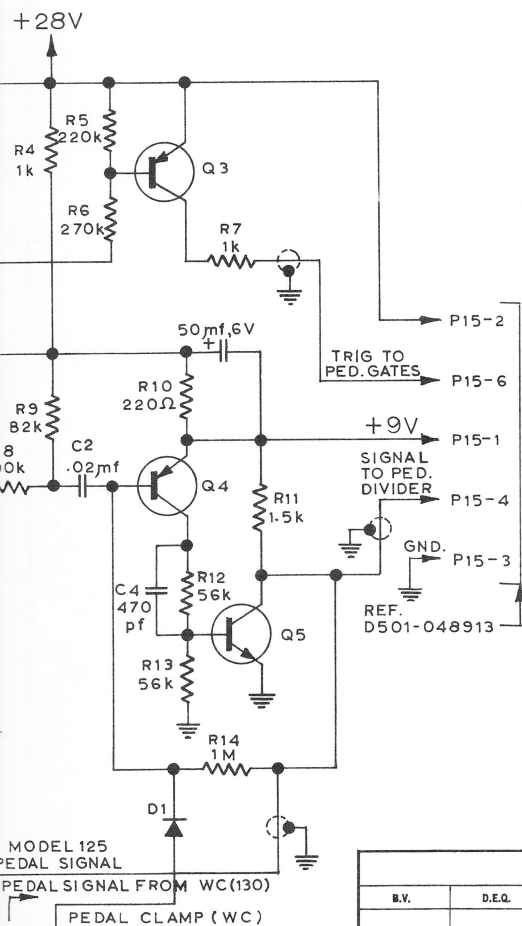
6-048866

P2-15 FIVE NOTE PEDAL SUSTAIN BOARD - C506-048860

TO THE

TRANSISTOR PEDAL LATCH AND SUSTAIN CIRCUIT

Reference: *C501-051948 and D501-051972

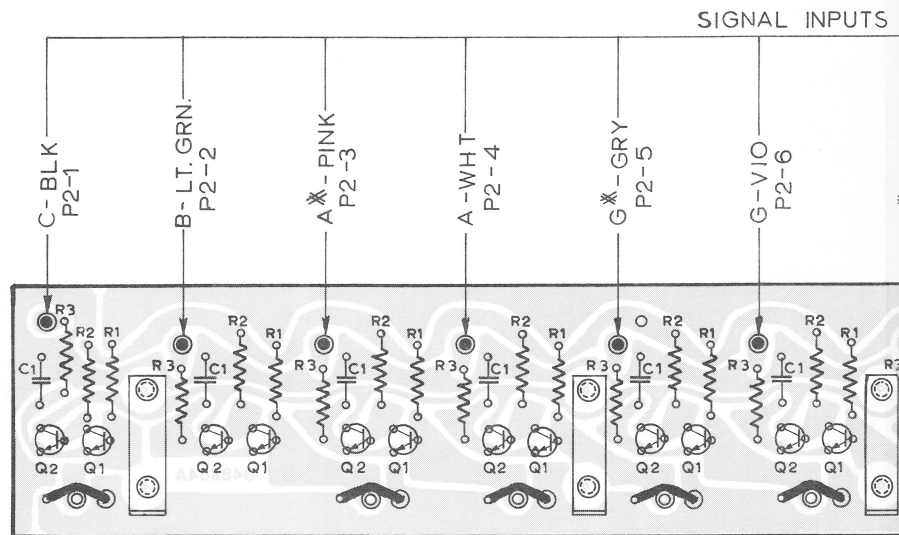
MODEL 125
PEDAL SIGNAL
PEDAL SIGNAL FROM WC(130)
PEDAL CLAMP (WC)
P2-14 P2-15

REF. D579-375 A

This circuit provides wipeout and latch by utilizing the switching mode characteristics of a pair of NPN transistors, stable in two states. Assume Q1 is on. Since the saturation voltage of Q1 is small relative to the conduction bias for Q2, Q2 will remain off and Q1 will remain on unless the base emitter is reverse biased. Assuming Q2 is on, the emitter will be negative with respect to the +12V or positive supply by the small saturation voltage of Q2. Therefore, as long as Q1 is off, Q2 will remain on. If the voltage on the signal buss, or base of Q1, is negative with respect to the emitter when Q2 is on, this is a stable state. If the signal buss, or base of Q1, is positive with respect to the emitter when Q1 is on, this is a stable state. Since both conditions can be satisfied with the same value of voltage, multiple circuits can be connected to the same buss to maintain some circuits in the first stable state (Q1 on) and some in the second stable state (Q2 on). Thus, if a circuit is in the first stable state, the corresponding signal is permanently (until switched) latched to the signal buss. It is obvious that only one circuit can be in the first stable state. Assume two circuits are in the first stable state momentarily. If both signals were negative, the first one to switch positive would reverse bias its Q1 and switch to the second stable state. If both signals were positive the first one to switch negative would control the signal buss and reverse bias Q1 on the other circuit, switching it to the second stable state. It can be seen that this is true even when two switches are closed simultaneously, since the base of Q1 for the two transistors keyed are tied together through the switch buss. However, if the switch corresponding to the latched circuit is opened, the switch buss voltage can go positive until the voltage on the base of Q1 for the other circuit is sufficient to turn on the switch to the new circuit, thus, turning the first circuit off through the signal buss. The signal used to trigger the pedal divider circuit is taken from the signal buss via the transistor Q5 collector. The signal used to trigger the pedal gates is taken from the switch buss via transistor Q3 collector and resistor R7. Q3 amplifies the audio present on the switch buss when a switch is closed, and D8 peak detects this signal for gating. (Diode is not shown on this schematic). A positive DC voltage from D8 is applied to a pair of diodes in both the 8 and 16 foot diode gates, located on the pedal filter. The pedal signals are blocked by these diodes until the positive voltage is applied by closing the pedal switch. Pedal sustain is accomplished in the following manner: with pedal sustain tab on, the contacts of the pedal sustain switch are open; the voltage present at the collector of transistor Q5, when keying the pedal circuits, will charge C18. Upon release of the pedal, the capacitor discharges slowly, keeping a positive voltage at the diode junction for the period of discharge time. With the pedal sustain tab off the pedal sustain switch is closed, bypassing C8 with R36 resistor. Diode D8 prevents C18 from discharging into the collector circuit of Q5.

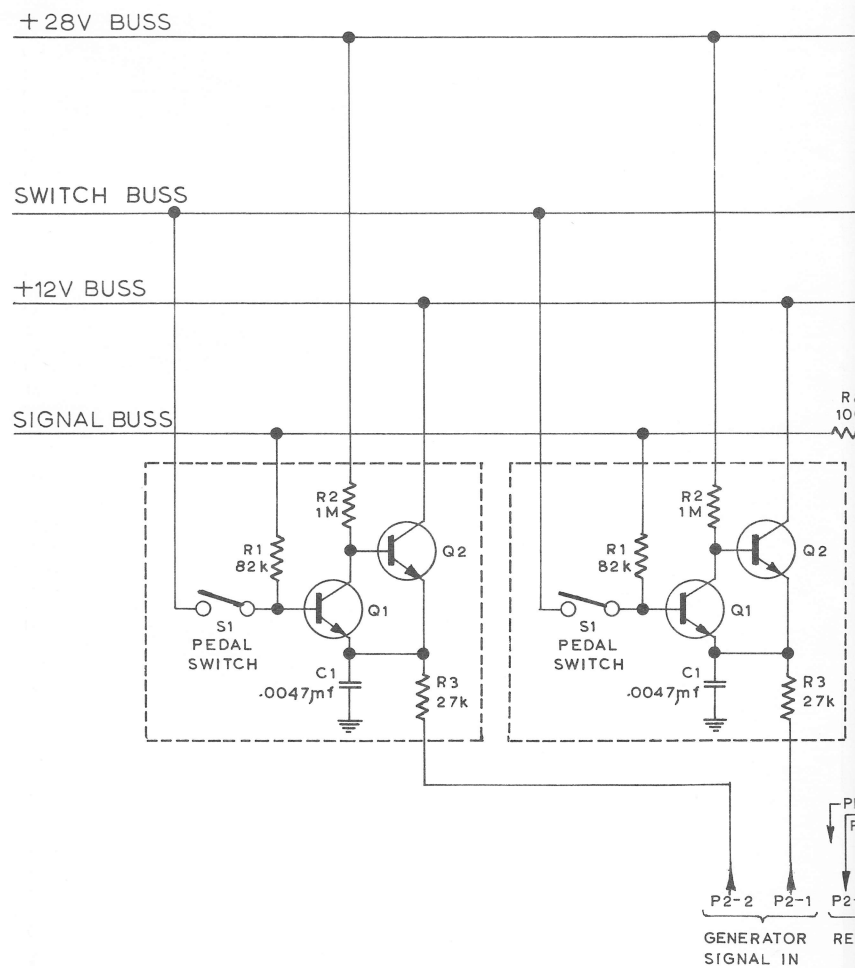
RECORD OF CHANGE

PRINT DISTRIBUTION						DATE		PART NAME		
B.V.	D.E.Q.	BOULD.	B.B.L.			1-5-72		PEDAL SUSTAIN CIRCUIT BDS		
CIN.	GR.	CON.	FAY	B.E.I.	CAN.			B/M GR. IT.		
						APP'D.		USED ON		
						APP'D.		DWN. SCALE NEXT ASSEM.		
						FINISH		REQ. SUPERSEDES		
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UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:						DECIMAL ± .005 FRACTIONAL ± .015		ANGLE ± 1/4°		REV.

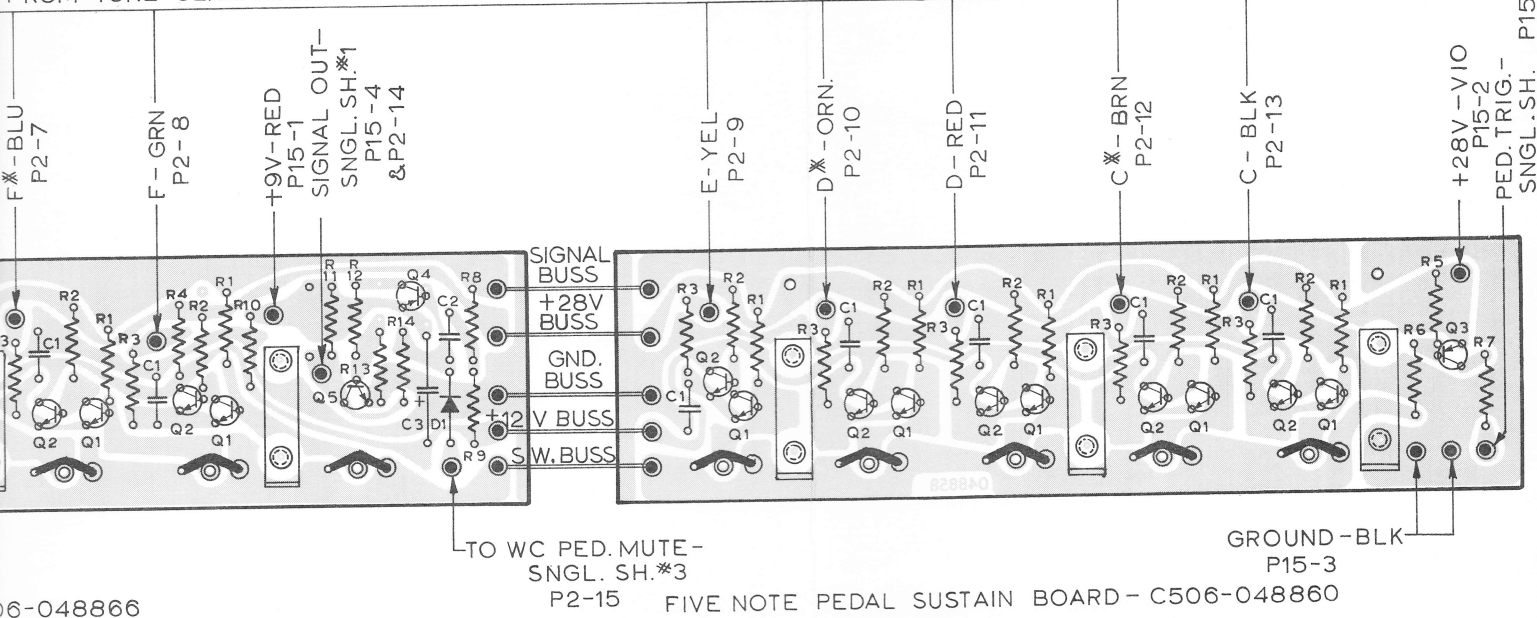


EIGHT NOTE PEDAL SUSTAIN BOARD- C50

NOTE: LATCH CIRCUITS B THRU E ARE OFFSET TO LEFT OF THEIR RESPECTIVE SWITCHES.

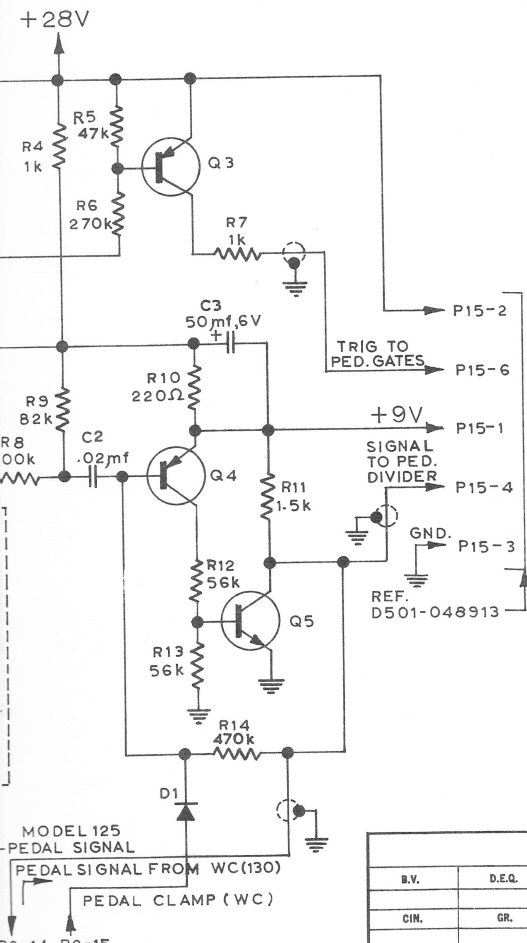


FROM TONE GENERATOR



TO THE

TRANSISTOR PEDAL LATCH AND SUSTAIN CIRCUIT

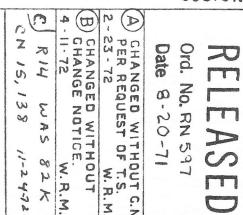


REF. D579-375 A

This circuit provides wipeout and latch by utilizing the switching mode characteristics of a pair of NPN transistors, stable in two states. Assume Q1 is on. Since the saturation voltage of Q1 is small relative to the conduction bias for Q2, Q2 will remain off and Q1 will remain on unless the base emitter is reverse biased. Assuming Q2 is on, the emitter will be negative with respect to the +12V or positive supply by the small saturation voltage of Q2. Therefore, as long as Q1 is off, Q2 will remain on. If the voltage on the signal buss, or base of Q1, is negative with respect to the emitter when Q2 is on, this is a stable state. If the signal buss, or base, of Q1 is positive with respect to the emitter when Q1 is on, this is a stable state. Since both conditions can be satisfied with the same value of voltage, multiple circuits can be connected to the same buss to maintain some circuits in the first stable state (Q1 on) and some in the second stable state (Q2 on). Thus, if a circuit is in the first stable state, the corresponding signal is permanently (until switched) latched to the signal buss. It is obvious that only one circuit can be in the first stable state. Assume two circuits are in the first stable state momentarily. If both signals were negative, the first one to switch positive would reverse bias its Q1 and switch to the second stable state. If both signals were positive the first one to switch negative would control the signal buss and reverse bias Q1 on the other circuit, switching it to the second stable state. It can be seen that this is true even when two switches are closed simultaneously, since the base of Q1 for the two transistors keyed are tied together through the switch buss. However, if the switch corresponding to the latched circuit is opened, the switch buss voltage can go positive until the voltage on the base of Q1 for the other circuit is sufficient to turn on the switch to the new circuit, thus, turning the first circuit off through the signal buss. The signal used to trigger the pedal divider circuit is taken from the signal buss via the transistor Q5 collector. The signal used to trigger the pedal gates is taken from the switch buss via transistor Q3 collector and resistor R7. Q3 amplifies the audio present on the switch buss when a switch is closed, and D8 peak detects this signal for gating. (Diode is not shown on this schematic). A positive DC voltage from D8 is applied to a pair of diodes in both the 8 and 16 foot diode gates, located on the pedal filter. The pedal signals are blocked by these diodes until the positive voltage is applied by closing the pedal switch. Pedal sustain is accomplished in the following manner: with pedal sustain tab on, the contacts of the pedal sustain switch are open; the voltage present at the collector of transistor Q5, when keying the pedal circuits, will charge C18. Upon release of the pedal, the capacitor discharges slowly, keeping a positive voltage at the diode junction for the period of discharge time. With the pedal sustain tab off the pedal sustain switch is closed, bypassing C8 with R36 resistor. Diode D8 prevents C18 from discharging into the collector circuit of Q5.

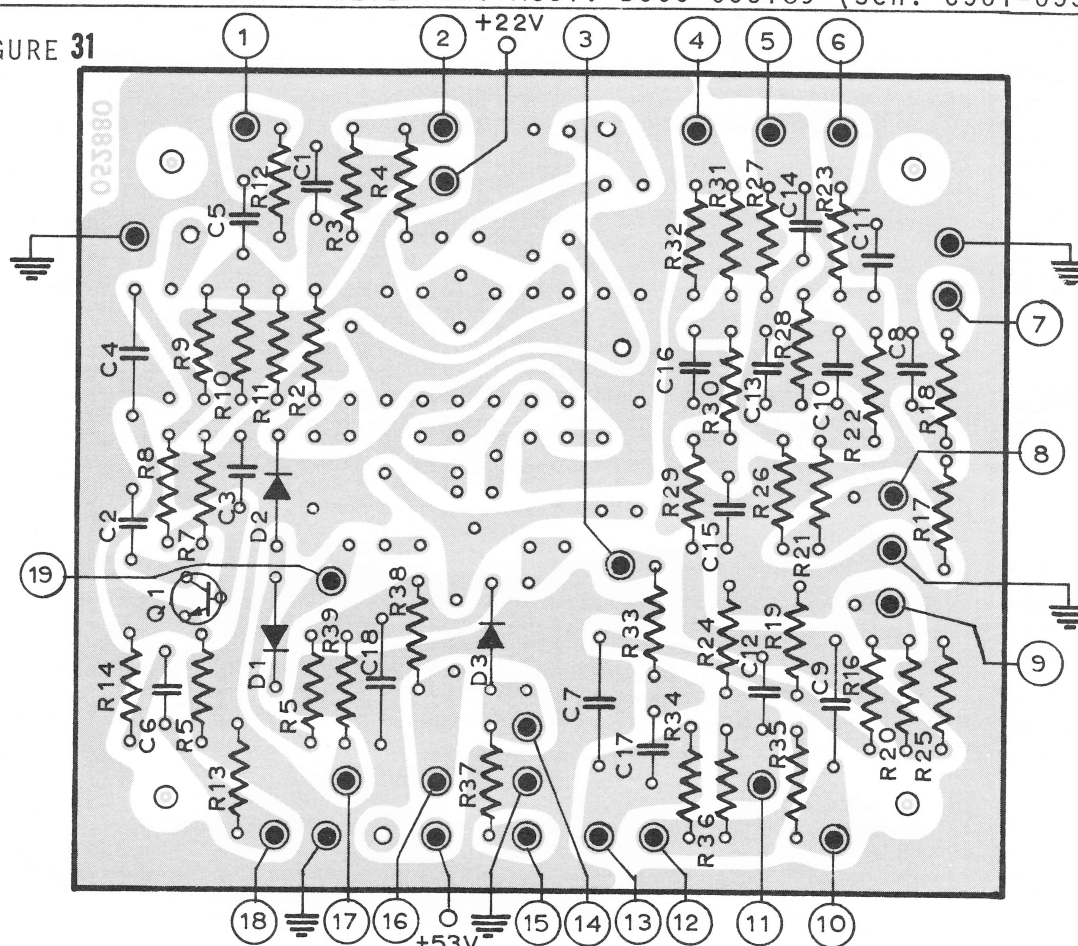
RECORD OF CHANGE

PRINT DISTRIBUTION						DWN. <i>a.v. j.d.</i>		PART NAME	
B.V.	D.E.Q.	BOULD.	B.B.L.			DATE	1-5-72	PEDAL SUSTAIN CIRCUIT BDS	
CIN.	GR.	CON.	FAY	B.E.I.	CAN.	CH'D.		B/M	GR. IT.
						APP'D.		USED ON	
						APP'D.		DWN. SCALE	NEXT ASSEM.
						FINISH		REQ.	SUPERSEDES
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UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:		DECIMAL ± .005 FRACTIONAL ± .015		ANGLE ± 1/4°				REV.	A

[illegible]

PEDAL & ACCOMP. FILTER BD. ASSY. B500-053189 (Sch. C501-053181)

FIGURE 31

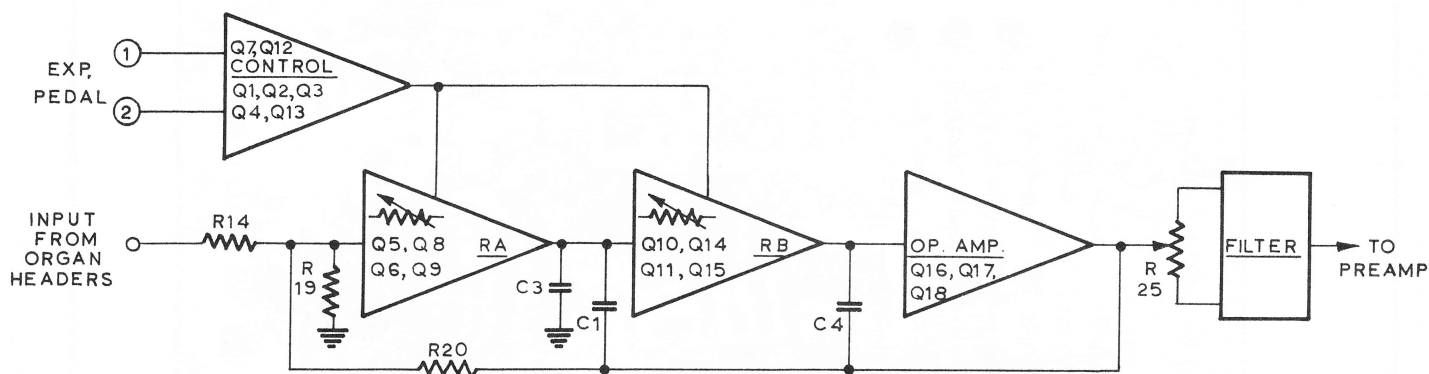


ITEM	DESCRIPTION	WIRE COLOR
1	FROM PEDAL LOUD/SOFT SWITCH	LT. GREEN
2	FROM PEDAL STRING BASS TAB SWITCH	YELLOW
3	8' W.O. ACCOMP. HEADER INPUT	BLUE
4	TO 4' FLUTE ACCOMP. TAB SWITCH	GREEN
5	TO 8' STRING ACCOMP. TAB SWITCH	RED
6	TO 8' FLUTE ACCOMP. TAB SWITCH	ORANGE
7	TO 8' DIAPASON ACCOMP. TAB SWITCH	BROWN
8	FROM WONDERCHORD	SNGL. SH.
9	TO WONDERCHORD	SNGL. SH. #4
10	4' <input type="checkbox"/> ACCOMP. HEADER INPUT	YELLOW
11	4' T.O. ACCOMP. HEADER INPUT	PINK
12	"A" HEADER BUCKING VOLTAGE	RED
13	8' <input type="checkbox"/> ACCOMP. HEADER INPUT	GRAY
14	PEDAL GATE DEFEAT	SNGL. SH. #2
15	PEDAL GATE	SNGL. SH.
16	PEDAL GATE FROM WONDERCHORD	SNGL. SH. #1
17	TO PEDAL SUSTAIN SWITCH	SNGL. SH.
18	TO PEDAL PREAMP INPUT	SNGL. SH.
19	INPUT FROM PEDAL DIVIDER	SNGL. SH. #1

MUTED REED THEORY

Reference: Schematic - D501-053950
Figures - 11 & 32

The Muted Reed is a filter with a variable bandpass characteristic controlled by the organ expression pedal. The circuit consists of two voltage controlled lo-pass filters, control circuitry for these filters and an operational amplifier followed by a bandpass filter as shown in the simplified diagram below.



Signals from the organ headers, via level set resistors, are supplied to the input of the first filter stage (RA) which consists of two differential amplifier pairs (Q5-Q8 and Q6-Q9) connected in parallel to act as a variable resistance, and, in conjunction with C3 and C1 forms a lo-pass filter. Similarly, RB together with C4 forms a second variable lo-pass filter, with its output applied directly to the operational amplifier (Q16-Q17-Q18 or alternately, an integrated circuit). A feedback loop, consisting of C4, C1 and R20 feeds the output of each section back to the input of RA. The operational amplifier output is applied to the Muted Reed volume control, which, together with associated components form a bandpass filter to achieve the reed voicing.

RA and RB are identical and act together to form the variable "R" components of a variable R-C type lo-pass filter. Points ① and ② are taken from the organ preamp board D.C. expression control. Assuming the expression pedal to be at minimum (up), Point ① will be highly positive with respect to Point ②, thereby reverse-biasing Q2 so no current will flow to Q3.

Q3 is the current source for Q4 and Q13 which respectively furnish current to the differential amplifier pairs Q5-Q8 and Q10-Q14. With Q3 cut off, its collector will be highly positive, cutting off Q4 and Q13 so no current will flow to the differential amplifiers, rendering them highly resistive to the incoming signal. Similarly, the emitter of Q3 will be highly negative, cutting off Q7 and Q12, the respective current source for Q6-Q9 and Q11-Q15, so they also will be in a high resistive state with respect to the signal.

With the expression pedal depressed (down) Point ① will be negative with respect to Point ②, forward biasing Q2 which will cause Q3 to conduct, so that its collector will be less positive and its emitter less negative. This will forward bias Q4-Q13-Q7 and Q12, furnishing current to the differential amplifiers, allowing them to be in a low-resistance state with respect to the signal. In this manner, the differential amplifiers act as the variable "R" of the R.C. filter.

It is musically desirable for a small movement of the expression pedal to cause a large change in the Muted Reed filter characteristics, therefore Q1 is connected in such a manner as to simulate a voltage variable resistor. As Q2 conducts, the current through R2 and R3 forward biases Q1 decreasing its resistance, resulting in a further increase in the current conduction of Q2.

Output from the collectors of Q14 and Q15 is applied directly to Q16 (common emitter) and Q17 (emitter follower) which together form the operational amplifier. R25 and C8 form a bandpass network, with output applied to the organ preamplifier.

The net result is a variable, expression pedal controlled filter with a low frequency roll-off point at 560 Hz (with the expression pedal at minimum) and varying to 2200 Hz (at maximum pedal position), and having a reed quality.

MUTED REED BOARD ASSY.(C500-053966)

(Schematic D501-053950)

BOARD TO BE USED AS ALTERNATE FOR AND TO BE
COMPLETELY INTERCHANGEABLE WITH THE ASSY.
CONTAINING THE INTEGRATED CIRCUIT OR AMP

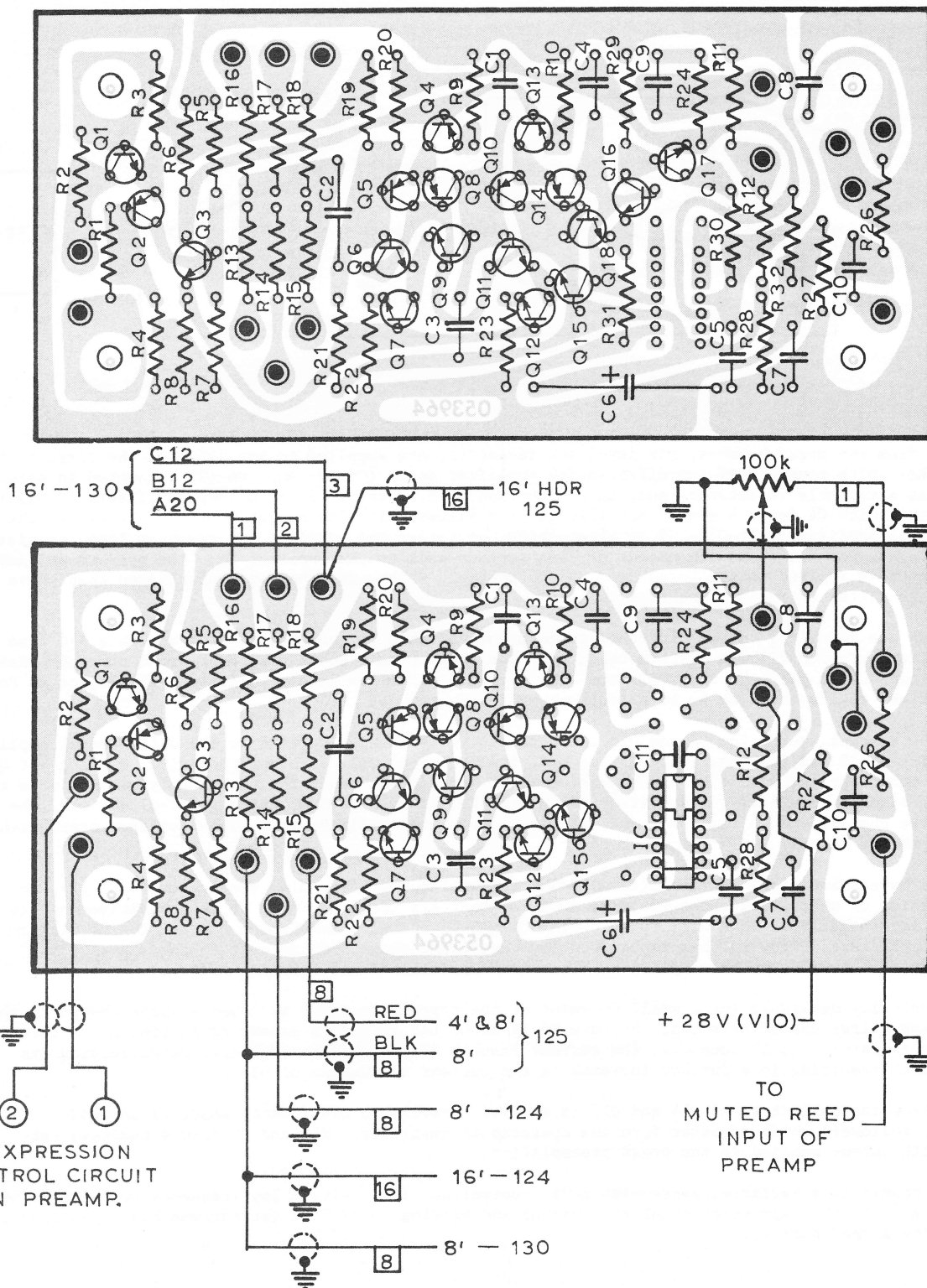
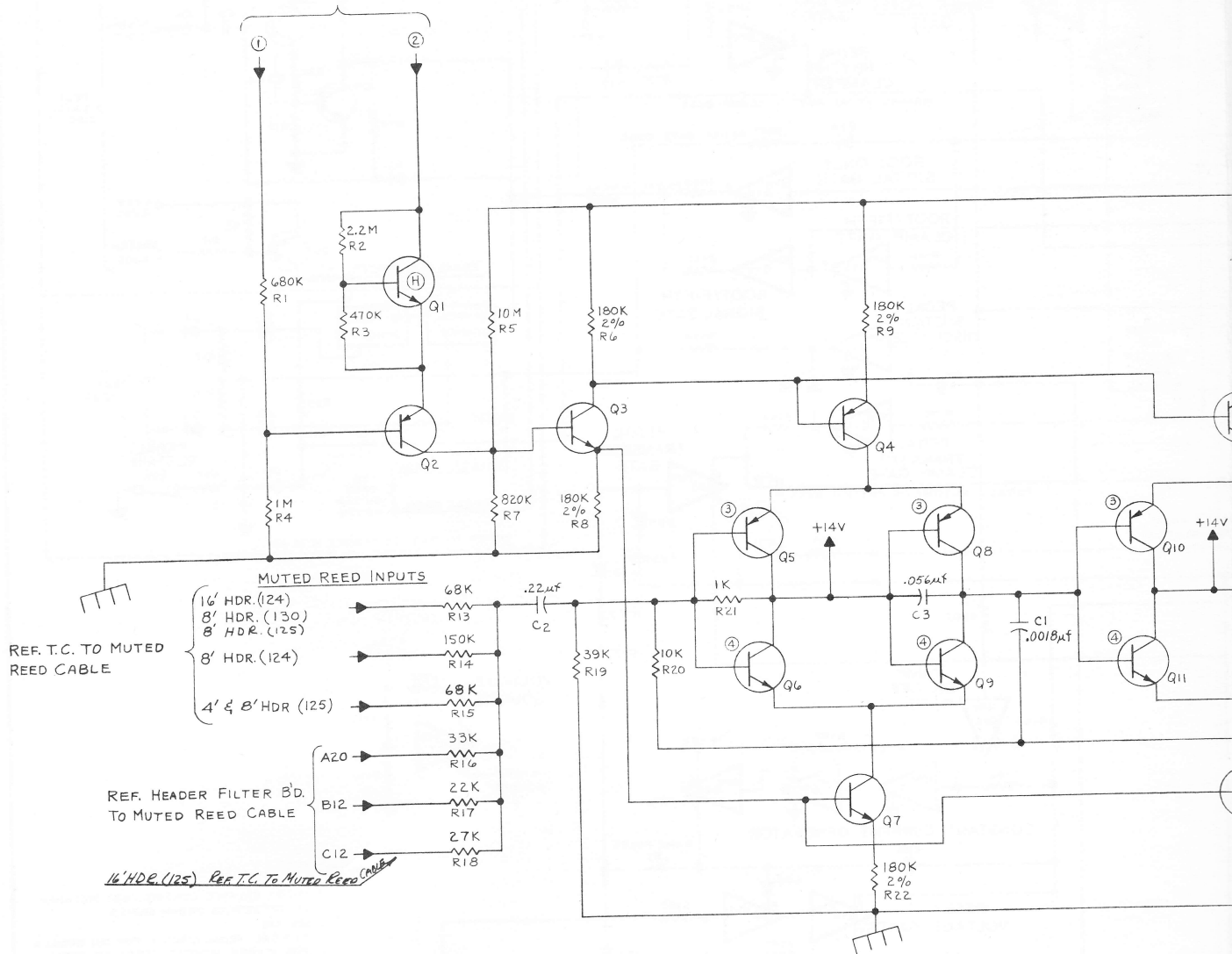



FIGURE 32

FROM PREAMP B'D. EXP. PEDAL
D.C. CONTROL. (REF. C501-053425).



NOTES:

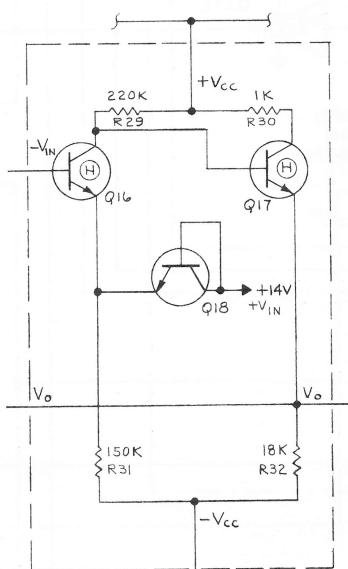
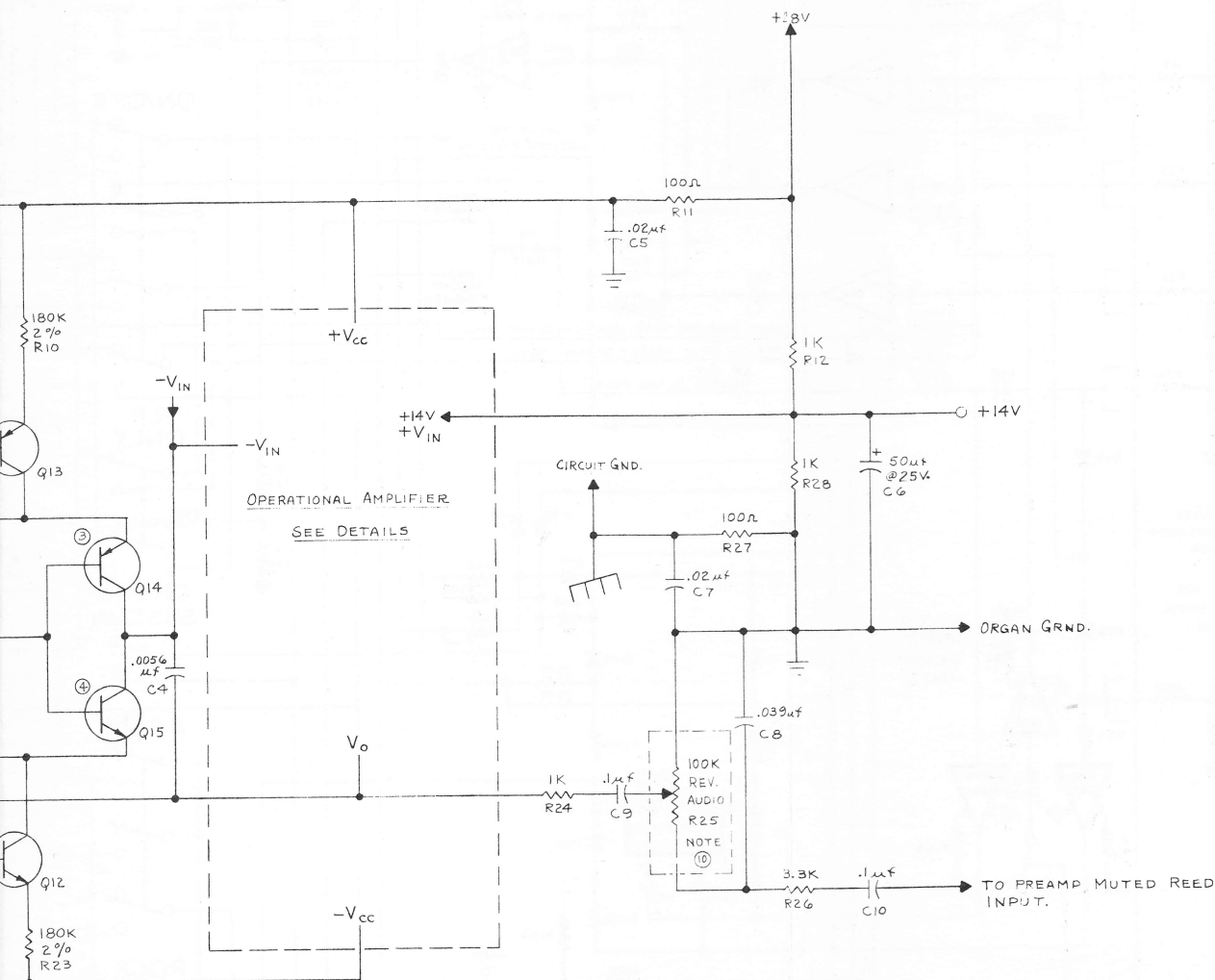
- ① COLLECTOR OF EXPRESSION CONTROL TRANSISTOR.
- ② EMITTER OF EXPRESSION CONTROL TRANSISTOR.
- ③ EACH PAIR OF PNP TRANSISTORS MUST BE MATCHED FOR EMITTER-BASE DROP (PER. S627).
- ④ EACH PAIR OF NPN TRANSISTORS MUST BE MATCHED FOR BASE-EMITTER DROP (PER S627).
- ⑤ TRANSISTORS TO BE SELECTED PER S429- AS INDICATED.
- ⑦ (a) C1 = .0015μF WITH DISCRETE OPERATIONAL AMPLIFIER.
(b) C1 = .0018μF WITH INTEGRATED CIRCUIT OPERATIONAL AMPLIFIER.
- ⑧  - INDICATES DECOUPLED GROUND FOR MUTED REED CIRCUIT ONLY.
- ⑨ ALL INPUTS, OUTPUTS, & SUPPLY VOLTAGES INCLUDED IN T.C. TO MUTED REED CABLE.
- ⑩ LOCATED IN SOLO BASS KEYCAP. REF. MUTED REED CONTROL CABLE.

RELEASED

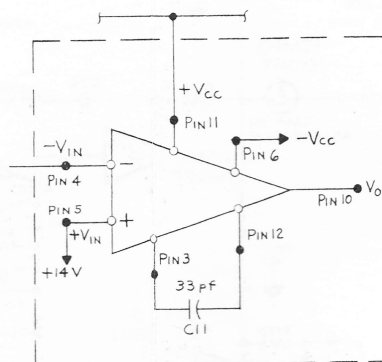
Ord. No. J.N. 14680

Date 10-26-71

ADDITIONAL INFO. PER
TECH. SERVICE REQUEST
NO. J.N. NCR 2-14-72



DETAIL FOR DISCRETE
OPERATIONAL AMPLIFIER

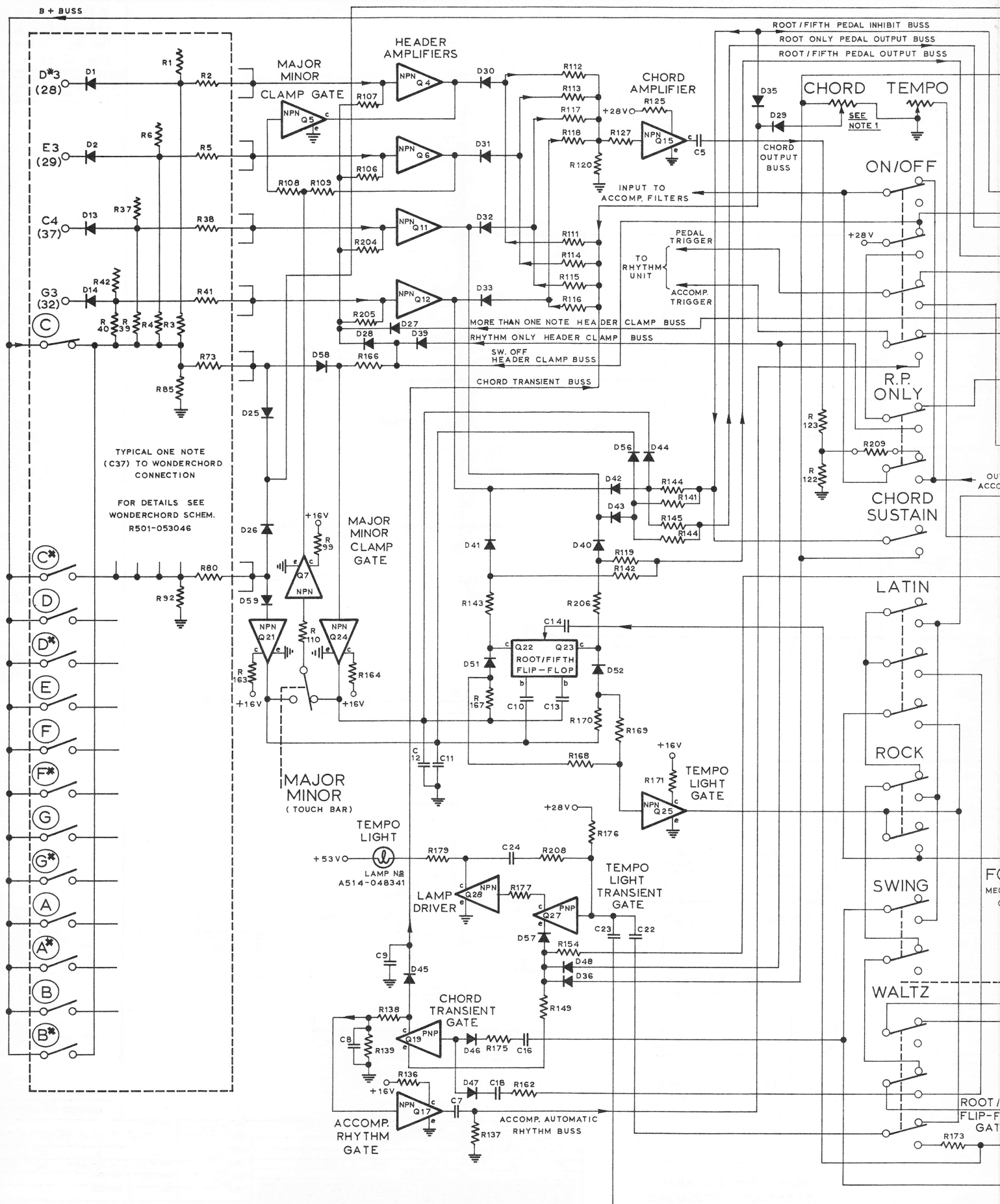


DETAIL FOR INTEGRATED CIRCUIT
OPERATIONAL AMPLIFIER

COMPONENTS (LAST N°)
R - 32
C - 11
Q - 18

RECORD OF CHANGE

POINT DISTRIBUTION						DATE		MUTED REED SCHEMATIC			
S.Y.	S.E.L.	S.M.S.	S.L.L.	S.L.L.	S.L.L.	DATE	10-15-71				
CON.	CON.	CON.	FAT	S.E.L.	CAL.	APP'D.	<i>Be</i>				
SBL-18R						APP'D.	<i>Be</i>				
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UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:						DECIMAL ± .005 FRACTIONAL ± .015		ANGLE ± 14°		REV.	



WONDERCHORD CIRCUIT THEORY

The Baldwin WonderChord is an automatic chord-pedal system and an automatic rhythm system which may be used separately or in conjunction with each other.

By depressing a single key in the 13 note WonderChord range on the Accompaniment manual, the WonderChord will play major or minor triads (3 note chords) along with the appropriate pedal tone. These chords and pedal notes can be made to sound continuously or in any one of five rhythm patterns. These rhythm patterns consist of the rhythmic keying of the chord, pedal root, and pedal fifth in the sequence shown in the Rhythm Pattern Chart. The rhythms are selected by five (5) mutually cancelling push buttons. The WonderChord also keys the Rhythm Percussion voices of the organ to achieve automatic rhythm. The volume is controlled by the Rhythm Volume control to allow the organist to balance the level of the Rhythm voices with the rest of the organ.

CONTROLS FOR THE WONDERCHORD:

1. A push-push ON-OFF button which controls the entire WonderChord system.
2. A Rhythm Only button (push-push) which allows the WonderChord to be used as an automatic rhythm system while playing the organ in a conventional manner.
3. Five (5) Rhythm Selector buttons: Waltz, Fox Trot, Swing, Rock and Latin.
4. A continuously variable Tempo control.
5. A downbeat lamp which flashes on the first beat of a measure.
6. A Touch Bar, a part of the lower keyboard frame which changes the Accompaniment chords from major to minor when gently pushed downward.
7. A Chord Sustain button. When the Chord Sustain button is depressed, the chord and pedal sound continuously. When the Chord Sustain button is not depressed, the pedal and chord sound in rhythm.
8. A continuously variable Rhythm Volume control.

PHYSICAL:

The WonderChord circuitry is contained on a single printed circuit board. All switching functions are contained in the control head and the Rhythm Percussion voices are generated on the Rhythm Voice board. Circuits are shown on the following schematics:

WONDERCHORD SCHEMATIC - R501-053046
CONTROL HEAD SCHEMATIC - D501-052784
VOICE RHYTHM SCHEMATIC - D501-053187

DIODE KEYSWITCH LOGIC:

When a single key is depressed, the diode keyswitch logic selects the four (4) related frequencies that form the major and minor triad chords of the note depressed: the root, the minor third, the major third, and the fifth. For example, when Note "C" is depressed, notes C-E-D#-G are selected. Notes C-E-G form the major triad; Notes C-D#-G form the minor triad (See Schematic C579-376). Referring to WonderChord Schematic R501-053046, an octave of square wave signals from the organ tone generator is applied via disconnect #4 to a series of 24 diode gates, consisting of D1 through D24. Thirteen (13) keyswitches are connected to the diode gates. (Top "C" of the keyswitches is cross-wired to bottom "C", hence, there are 12 wires connecting the keyswitches to the diode gates). Depressing key "C", for instance, will furnish a positive voltage from the common side of the keyswitches via the keyswitch and disconnect #3 through R3, R4, R39, and R40 to D1, D2, D13, and D14, respectively, forward biasing these diodes and allowing them to conduct their respective generator frequencies.

Referring to the Simplified Keyswitch Logic Diagram diode gate D1 applies Note 28 (D#) to the base of Q4 via R2, D2 applies Note 29 (E) to the base of Q6 via R5, D13 applies Note 37 (C) to the base of Q11 via R38, and D14 applies Note 32 (G) to the base of Q12 via R41.

Transistors Q4, Q6, Q11, and Q12 act as header amplifiers for the four (4) notes corresponding to the minor third, major third, root, and fifth of the "C" key just depressed.

At the same time, a positive voltage is applied by the keyswitch, via R73 and D58, to the base of Q24, causing Q24 to saturate.

MAJOR-MINOR LOGIC:

Now that the four frequencies are available, it becomes necessary to form either a major chord (C-E-G) or a minor chord (C-D#-G). This function is controlled by the Touch Bar.

For a major chord the Touch Bar is not depressed. The Touch Bar switch is a single pole, double throw switch that has a normally closed contact which connects the collector of Q24 through R110 to the base of Q7. Since Q24 is being held in saturation by the positive voltage from the keyswitch, no base current is available to Q7. With Q7 off, positive voltage from R99 appears at its collector. This voltage is supplied to the base of Q5, turning Q5 on. Major third signal (Note 29 "E") from Q6 passes through while Q5 clamps the collector of Q4 to ground, keeping the minor third signal (Note 28 "D#") on Q4 from sounding.

The minor chord sounds when the Touch Bar is depressed. With the Touch Bar depressed, R110 is disconnected from the collector of Q24 and connected to the collector of Q21 via the Touch Bar switch. Since Q21 is off, a positive voltage from its collector is applied through R110 to the base of Q7, causing reversal of conditions of Q5, Q6, and Q7. This reversal allows the minor third signal to play through Q4 while inhibiting the major third signal appearing at the collector of Q6.

For example, if Note C# is played instead of Note C, Q4 will carry the major third signal while Q6 carries the minor third signal; Q24 will be off and Q21 will be saturated, due to the positive voltage from the keyswitch via D59. The positive voltage at the collector of Q24 will saturate Q7 via the normally closed contact of the Touch Bar switch and R110, clamping the junction of R108 and R109 to ground. This turns Q5 off, allowing the major third signal from Q4 to sound and inhibiting the minor third signal from Q6 by clamping its collector to ground via R109 and Q7.

Whatever state Q24 is in (on or off), Q21 will be in the opposite state; depressing the Touch Bar will reverse the states of Q5, Q6, and Q7, which determines whether signal from Q4 and Q6 will sound. See WonderChord Master Chart.

CHORD PERCUSSION GATE:

The signals at the collectors of Q4, Q6, Q11, and Q12 are applied to diode gates D30, D31, D32, and D33 (signal from either Q4 or Q6 will pass depending on the state of Q5 and Q7, as previously discussed).

When these diodes are forward biased via R111, R114, R115, and R116, the signals will be conducted via R112, R113, R117, R118, and R127 to linear chord amplifier Q15, which is coupled by C5 to the 8' Accompaniment filters in the organ.

These diodes can be forward biased "full-on" via D35 when the Chord Sustain switch is closed (depressed).

The diodes can also be "pulsed-on" by Q19 via blocking diode D45. (Q19 is pulsed, in rhythm, from the ramp generator, yet to be discussed).

Capacitor C9 acts as a time constant to control the decay of the chord.

ROOT FIFTH LOGIC: (PEDALS)

The Pedal tones can be made to sound in one of two modes: either the Root frequency, sounding continuously (when the Chord Sustain is actuated) or in a rhythmic pattern of root and fifth frequencies when the Chord Sustain knob is not depressed and one of the five Rhythm Pattern buttons is depressed.

The "Continuous" (Chord Sustain actuated) mode of operation will be discussed first. (Refer to the Simplified Root/Fifth Logic Diagram). Assuming Key "C" is depressed, header amplifier Q11 will carry the root frequency while header amplifier Q12 will carry the fifth frequency. These signals, from the collectors of Q11 and Q12, are applied to D43 and D42, respectively. These diodes are forward biased by the positive voltage from the Chord Sustain switch and resistors R141 and R140.

In the "Continuous Mode" it becomes necessary to inhibit the fifth frequency and allow only the root frequency to pass. This is accomplished by clamping the fifth frequency (from Q12) to ground through D44 and Q24. (Q24 is saturated when playing Key "C" is depressed, as previously discussed).

The root frequency (from Q11) is conducted through D43 and D144 to the base of Q18 where it is amplified and, via R148, applied directly to the pedal divider circuitry located in the organ tone color.

If Key "C#" is depressed instead, the root will appear on Q12 and the fifth on Q11, therefore, D56 will clamp the signal from D43 to ground via Q21 which is saturated via D59 and the C# keyswitch voltage.

When in a continuous mode, it is necessary to turn on the pedal gate diodes in the organ continuously. Positive voltage from the Chord Sustain switch accomplishes this via D34 and R121.

When one of the Rhythm buttons is depressed, the pedals will alternate rhythmically between the root and fifth notes. This is accomplished by the Root-Fifth Flip-Flop.

As discussed, Q11 and Q12 will carry the Root and Fifth frequencies (for playing Key "C"). When key "C" is depressed, Q24 saturates, resulting in a negative pulse at its collector which is applied to the Root-Fifth Flip-Flop via C13, turning Q23 off. The positive voltage at the collector of Q23, via R206, forward biases D40 allowing the root signal from Q11 to be conducted through D40 and R119 to the base of Q14, the Root-Fifth signal gate.

Conversely, if Key C# is depressed, Q21 saturates via D59, resulting in a negative pulse at the collector of Q21, which would be applied via C10 to the Flip-Flop, turning Q22 off so the positive voltage at its collector is then supplied through R143 and D41 to Q12, allowing it to conduct the root signal via D41 and R142 to Q14. Thus, it can be seen that the Root-Fifth Flip-Flop assures that the root pedal frequency will sound first when a key is initially depressed.

The Root-Fifth Flip-Flop will alternately select the root and fifth frequencies (from Q11 and Q12) in the same manner when it receives the ramp reset pulse from the rhythm ramp generator (to be discussed). This negative pulse is applied via C14 to the Flip-Flop.

Referring to the WonderChord Block Diagram, it can be seen that the collector voltage for Q11 and Q12 can be supplied by D32 and D33 (Chord Gate), D40 and D41 (Root-Fifth mode), or D43 and D42 (Root only, continuous mode).

The pedal Root-Fifth frequencies are conducted to the organ pedal divider circuitry by Q18 and R148 when in a root only, continuous mode; or by Q14 and R147 when in the root-fifth, alternating mode. When in the continuous mode, it is necessary to inhibit Q14 which carries the root-fifth pedal signal (from D40 and R119, D41 and R142). This is accomplished by clamping the base of Q14 to ground via Q13 which is saturated when the positive voltage is applied to Q13, via R146 from the Chord Sustain Control switch. When in the alternating (rhythm) mode, the pedals must sound transiently. This is accomplished by the Pedal Transient Gate Q20; which, via R153, D38 and R134, transiently operates the organ pedal diode gates, when Q20 receives a pulse from the WonderChord ramp generator. The organ Pedal Sustain functions normally when in this mode.

When two keys are held (disabling the WonderChord) and one key is then released, it is necessary to assure that the root of the remaining key will sound first. For example, if keys "C" and "C#" are played simultaneously, both Q24 and Q21 will saturate, and the resulting negative pulses at their collectors, coupled via C13 and C10 would result in improper operation of the Root-Fifth Flip-Flop, since a flip-flop responds correctly to only one input pulse at a time.

It is therefore necessary to disable Q24 and Q21. When two keys are depressed, Q8 (normally off) will be saturated via R105 and R130 (Q3 is off when two keys are depressed). Q8 then effectively grounds the junction of D25 and D26, so the positive keyswitch voltage will not affect Q24 and Q21.

When one of the two keys is released, Q8 will turn off, removing the junction of D25 and D26 from ground. If "C#" is released and "C" held, the positive keyswitch voltage via R73 and D58 would saturate Q24, resulting in a negative pulse at its collector, which, via C13, would correctly set the Root-Fifth Flip-Flop so the root frequency would sound first.

RAMP GENERATOR:

The ramp generator provides the timing pulses which trigger the WonderChord transient gates. Three pulses are obtained by driving two transistor switches, with differing emitter voltages, into saturation in sequence. A linear ramp voltage is used as a driving source and the slope of the ramp is adjusted by the Tempo control, which determines the measure time, or tempo.

Q29, Q30 and Q31 make up a constant current generator. This current flows from the emitter of Q29 to linearly charge C25. The value of the current is controlled by the Tempo control, through R180, to determine the slope of the ramp. With no note depressed, Q32 is saturated. The emitter of Q29 will be approximately +16 volts. When a key is depressed, Q32 is turned off and the emitter of Q29 will drop to about +1.5 V.D.C., and then begin to rise linearly as C25 charges. This negative-going voltage drop produces Pulse #1.

As the ramp voltage rises, Q37 and Q35 will turn on in sequence due to their increasing base currents through D54, D55, R189 and R188. Q37 produces negative-going Pulse #2 at its collector as it turns on, while Q35 produces Pulse #3.

The reset voltage is established at the junction of R191, R199 and R187, and will be about +10V for the Waltz and +5V for all other rhythms. When the ramp voltage reaches a value of the reset voltage plus the drop across the two diodes (D54 and D55), transistors Q33 and Q34 will turn on, rapidly discharging C25. During the discharge of C25, Q31 turns on, turning Q30 on, which clamps the base of Q29 to ground, preventing Q29 from supplying charging current during the discharge cycle. When C25 has been completely discharged, Q33 and Q34 will turn off, Q29 will turn on and the charging cycle repeats.

Reset and reference voltages for the emitters of Q37 and Q35 are established by the resistor divider chain R191, R199, R200, R201, R202 and R203. The reference voltages for Q37 and Q35 are coupled through Q38 and Q36, which provide regenerative feedback, causing Q37 and Q35 to have a fast switching time when they turn on.

WonderChord
Ramp Generator
(Cont'd.)

As the ramp voltage drops (during discharge), Q37 and Q35 rapidly turn off. The resulting positive rise at the collector of Q37 is coupled to the base of Q26 through C15 pulsing Q26 on, causing a negative pulse to appear at the collector of Q26. This is coupled through C14 to the Root-Fifth Flip-Flop, causing it to change state each time the ramp resets, thus alternating the pedal tones between root and fifth on every other ramp cycle.

Pulse #1 from the emitter of Q29 is always connected to the Pedal Transient Gate, via C17, R159 and D49. Pulse #2 from the collector of Q37 is always connected to the Chord Transient Gate Q19, via C16, R175 and D46.

Pulses #2 and #3 connect through the rhythm selector switches to the appropriate chord and/or pedal transient gates for the selected rhythm.

Pulse #3 is inhibited from the pedal gate on the first ramp, and every second ramp thereafter, in the Rock and Latin rhythms. Pulse #3 is connected by the Rock and Latin rhythm switches via R161, C21, C20 and D50 to the Pedal Transient Gate Q20. The junction of C20 and C21 is connected to the collector of Q25 when these rhythms are used. Depending on which key is depressed, Q25 will be saturated by the positive voltage from either Q21 or Q24 via R170-R169 or R167-R168, thus grounding the junction of C20-C21 during the first ramp cycle.

When the ramp resets, Q35 and Q37 turn off. The resulting positive pulse (from the collector of Q37) is applied by C15 to Q26, resulting in a negative pulse at its collector which is always coupled by C14 to the Root-Fifth Flip-Flop. Therefore, every time the ramp resets, the flip-flop will change state.

The positive saturation voltage for Q25 is then clamped to ground on the second ramp cycle, and every ramp cycle thereafter, by either D52 and Q23 or D51 and Q22. Therefore, the junction of C20-C21 is removed from ground and Pulse #3 will then actuate the Pedal Transient Gate (every second ramp cycle).

When the Chord Transient Gate, Q19 is pulsed on by the ramp, the positive voltage appearing at its collector also pulses Q17 on via R138, creating negative-going pulses which are coupled by C7 and the On-Off switch contacts to the organ Accompaniment Rhythm Percussion trigger circuit. The appropriate rhythm stops, selected via the Rhythm switches, will sound in conjunction with the chord.

When the Pedal Transient Gate, Q20, is pulsed on by the ramp, the positive voltage appearing at its collector is coupled by C19 and the ON-OFF switch contacts to the organ pedal Rhythm Percussion trigger circuit. The appropriate rhythm stops, selected via the Rhythm switches, will sound along with the pedal tones.

TEMPO LIGHT:

The Tempo light is operated by Q28, the driver, and Q27, the Tempo Light Transient Gate. Application of a negative pulse to the base of Q27 allows the positive emitter voltage to appear at its collector momentarily. The collector Q27 applies this voltage through R177 to the base of Q28, pulsing it on, completing the circuit from the +53 volt supply, R179, and Q28 to ground, causing the light to flash momentarily.

In the Waltz rhythm one ramp cycle establishes a complete measure, therefore the lamp must flash once each ramp (measure).

When the ramp resets, a positive pulse appearing at the collector of Q37 is applied via C15 to the base of Q26, causing it to saturate, developing a negative pulse at its collector. The Waltz switch (when depressed) couples this pulse via R173 and C22 to the Tempo Light circuitry.

In any rhythm other than Waltz, two ramp cycles are required for a complete measure. Therefore, the lamp must flash every second ramp. The negative pulse developed by Q25 every second ramp cycle is coupled through the rhythm switches (except Waltz) and C22 to the Tempo Light circuitry. The operation of Q25 every second ramp cycle has been previously explained.

SINGLE NOTE DETECTOR:

In the event two or more keys are depressed, it is necessary to disable the WonderChord to prevent dischords. This is accomplished by a circuit which detects the playing of more than one key in the thirteen key WonderChord range.

Transistors Q1 and Q2, along with resistors R97, R98 and R101, detect the amount of current drawn by the keyswitch logic circuitry.

Depressing one key in the WonderChord range draws sufficient current through resistors R97, R98 and R101, so that the resulting voltage drop will bias Q2 on, (Q1 remains off with only one note depressed). The collector of Q2 then supplies +28 volts (from its collector) to Q19 (Chord Transient Gate) and Q27 (Tempo Light Transient Gate). This positive voltage, via R102, also saturates Q3, causing its collector to go to ground potential. This negative-going excursion performs five functions:

WonderChord
Single Note Detector
(Cont'd.)

- A. Flashes the Tempo Light via C23.
- B. Turns Q32 off via R207, allowing the ramp to operate.
- C. Turns Q8 off via R130. Positive voltage from the collector of Q8 is applied by R131 and D37 to the organ pedal latch circuit, disabling it and preventing the organ pedal keys from sounding if accidentally depressed when the WonderChord is in operation.
- D. The positive collector voltage from Q8 also saturates Q9 via R132. Q9 clamps the organ pedal rhythm pulse to ground so the pedal rhythm cannot be triggered by playing an organ pedal key when the WonderChord is in operation. This is applied only to the organs equipped with manual rhythm operation.
- E. When a key is released, negative pulse from Q8 collector is momentarily saturating Q40, which applies +28V from its emitter to collector via R215 to Bass Guitar circuit, disabling it from second triggering and sounding. This is applied only to organs equipped with Bass Guitar filter.

When the key is released, Q2 and Q3 will cut off. The positive rise at the collector of Q3 is coupled via C6 to Q10, pulsing it on momentarily, discharging the organ pedal sustain capacitor via R134. This prevents the latched on pedal frequency from sounding as the pedal section reverts to normal operation.

When two or more keys are depressed in the WonderChord range, the voltage drop across R97 and R98 becomes large enough to turn Q1 on, effectively shorting the base-emitter junction of Q2, causing Q2 to cut off. The WonderChord operation is therefore defeated due to the loss of supply voltage to Q19, Q20, Q27, and Q3. The positive voltage from the collector of Q3 is fed by D27 to R205, R204, R106 and R107, saturating the header amplifiers and preventing their operation.

RHYTHM ONLY MODE:

When the Rhythm Only button is depressed, the following occurs:

- (A). The chord feature is defeated by supplying positive voltage through D39 and D28, via R205, R204, R106, and R107 to Q12, Q11, Q6 and Q4, saturating these transistors and preventing them from passing signals from the diode keyswitch logic.
- (B). The single note detector circuit is disabled by removing the voltage from the emitters of Q1 and Q2.
- (C). Supply voltage is applied via D48 to the emitters of Q27 via D57, Q19 via R149, and Q20 via R154, allowing them to operate.
- (D). Base current is supplied to Q3 via D39 and R103, turning Q3 on. This allows the ramp to operate by cutting Q32 off.
- (E). Base current is supplied by D39 and R135 to Q16 turning it on, clamping its collector to ground, preventing the pedal transient gate (Q20) from pulsing on the pedal diode gates in the organ.
- (F). The pedal (Q20) and chord (Q19) transient gates are then used to trigger the pedal and accompaniment rhythm percussion voices in the organ.
- (G). Q24 is saturated via D39 and R166, removing its positive collector voltage so the positive voltage from Q21 only will turn Q25 on, enabling the lamp to flash every second ramp when in any rhythm except Waltz.
- (H). The organ 8' Accompaniment keyswitch headers are connected to their respective filters.

+16V source is derived from +28V supply via resistor divider R211, R210 and base emitter circuit of Q39 transistor.

RHYTHM PATTERN CHART

PULSE

	1	2	3	1	2	3
WALTZ	*ROOT	CHORD	CHORD	*FIFTH	CHORD	CHORD
FOX TROT	*ROOT	CHORD		*FIFTH	CHORD	
SWING	*ROOT	*ROOT CHORD		*FIFTH	*FIFTH CHORD	
ROCK	*ROOT	CHORD		*FIFTH	CHORD	*FIFTH
LATIN	*ROOT	CHORD	CHORD	*FIFTH	CHORD	*FIFTH CHORD

* PEDAL NOTES

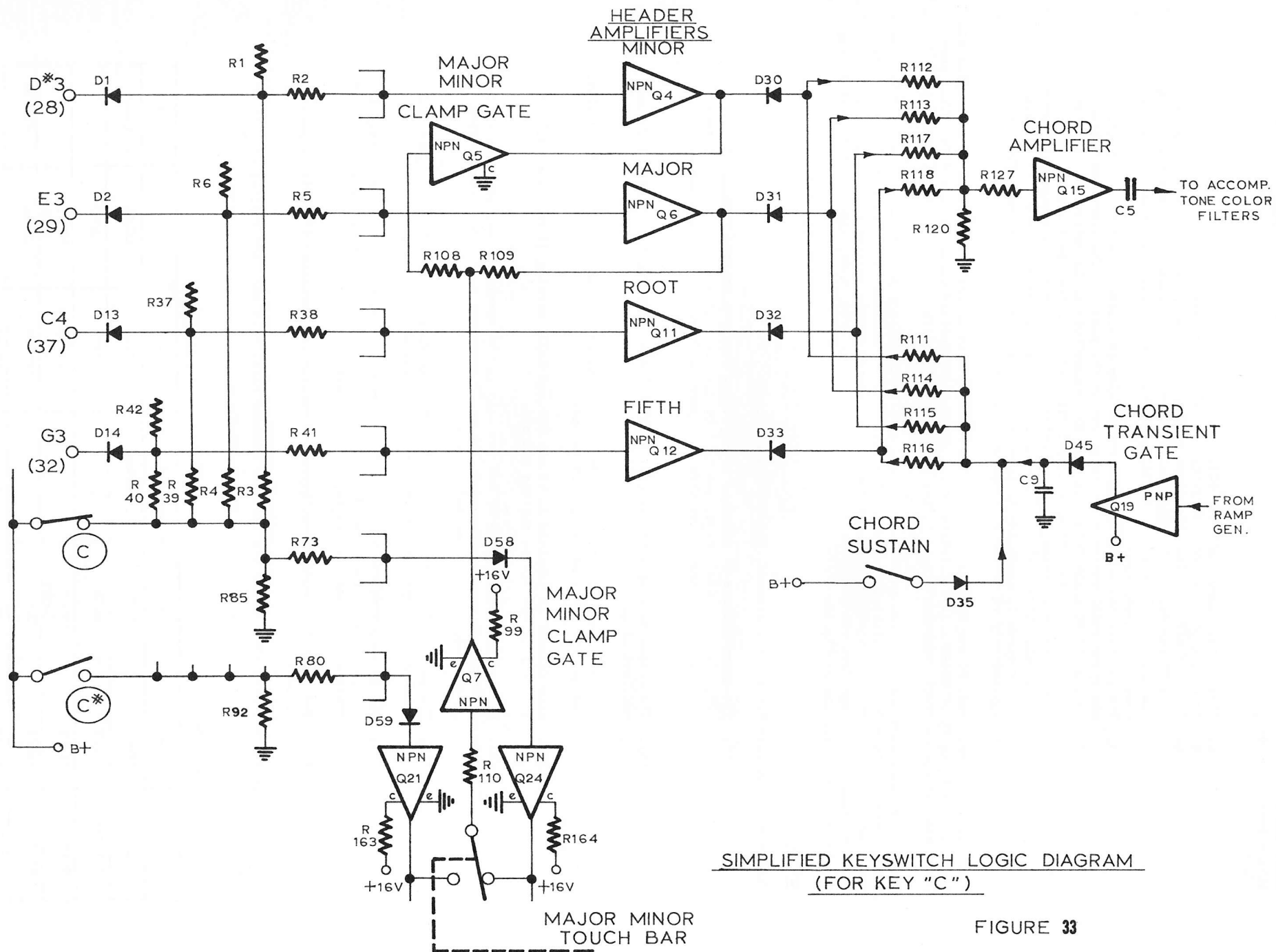


FIGURE 33

SIMPLIFIED ROOT/FIFTH AND ROOT ONLY (FIRST)
LOGIC DIAGRAM (FOR KEY "C")

FIGURE 34

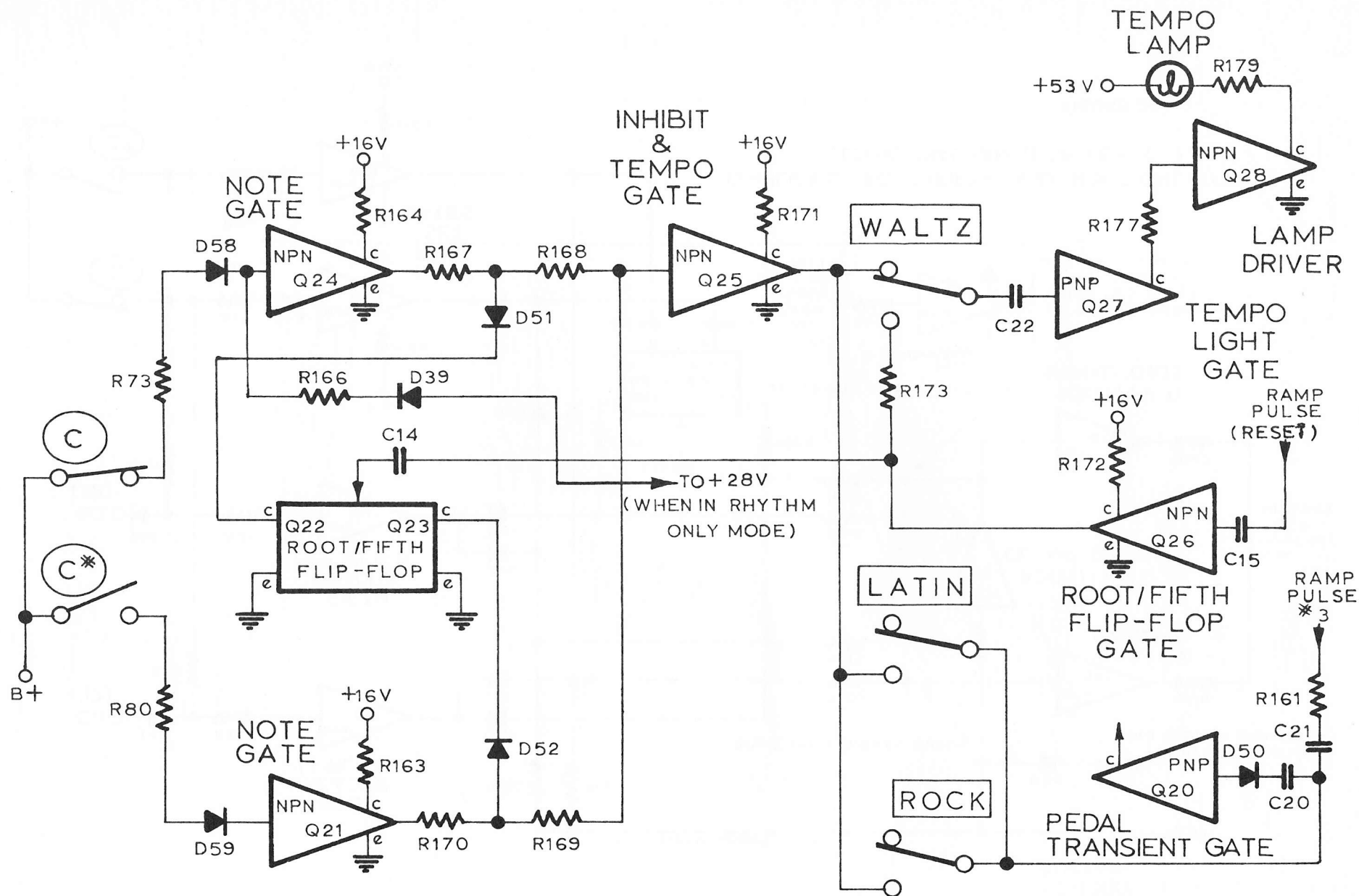
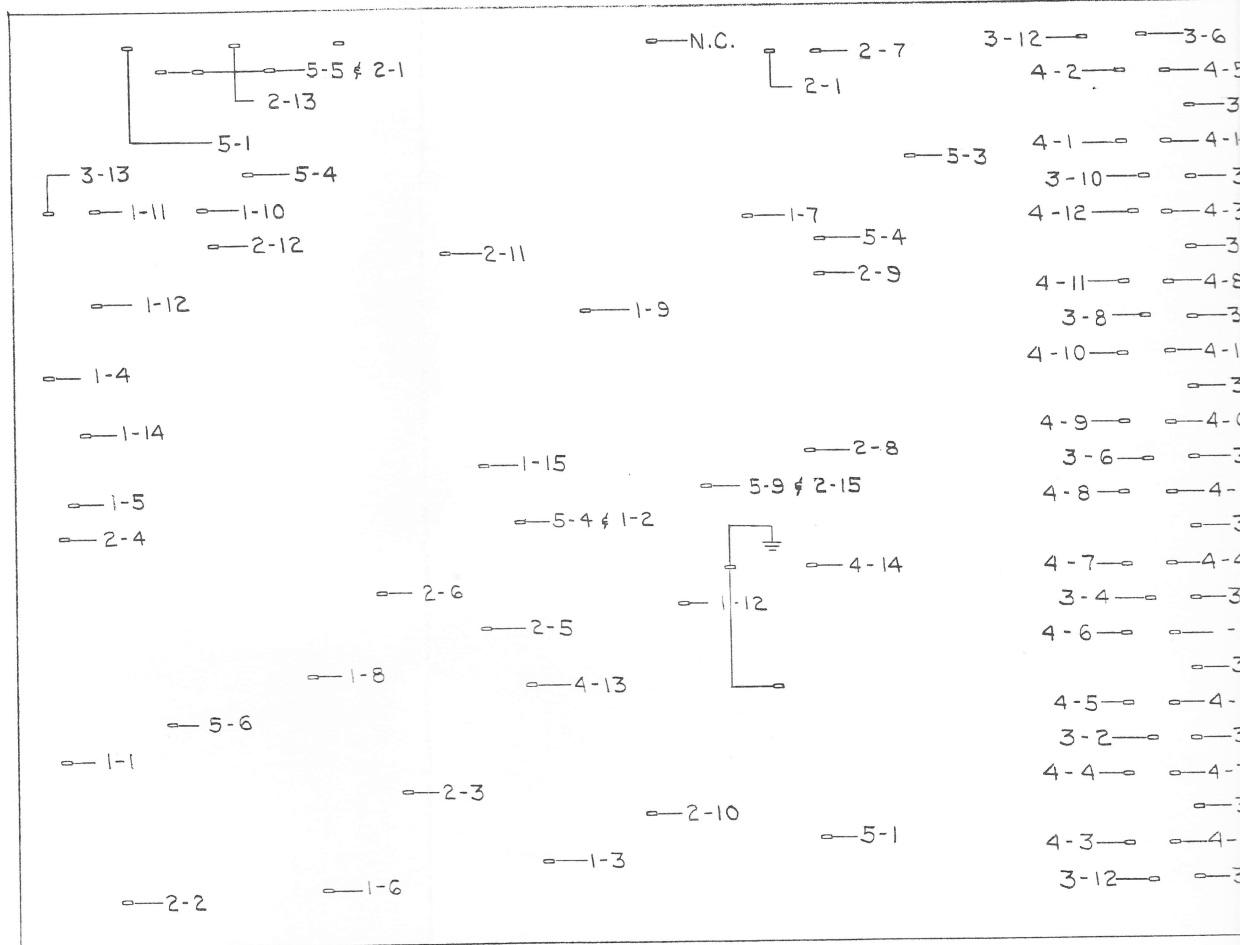


FIGURE 35—SIMPLIFIED TEMPO INDICATOR AND No. 3 PEDAL PULSE INHIBIT CIRCUIT (FOR KEY "C")



NOTE:

1. REFER TO WONDER CHORD SCHEMATIC R501-053046.
2. THE NUMBERED TERMINAL DESIGNATIONS INDICATE CONNECTOR NUMBER AND PIN NUMBER, EG.



PR			
B.V.	D.E.Q.	BOULD.	
CIN.	GR.	CON.	
FILE			5
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(B) REVISED TO CONFORM
TO RIVETED ASSY.
C.N.15,211 2-23-73 W.R.M.

5
3-11
10
3-4
3
-9
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-2
3-7
6
3-12
11
3-5
4
3-10
9
3-3
2
3-8
7
3-1
12
3-6

RECORD OF CHANGE

INT DISTRIBUTION			DRAWN D.DIEHL	PART NAME WONDER CHORD BD.	
			DATE 5-18-71	PIN WIRING DIAGRAM	
			CH'D. <i>DMH</i>	B/M 503-125-17 GR. NOTED IT.	
			APP'D. <i>Rok</i>	USED ON ORGANS 130B & BC 125B & BC	
			APP'D.	DRAWN SCALE	NEXT ASSEM.
			FINISH	REQ.	SUPERJEDES
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DECIMAL ± .005 FRACTIONAL ± .015			C 501-052889 B		

WONDERCHORD BOARD №2 ASSY. C500-052888

(Schematic R501-053046, Wiring Diagram C501-052887)

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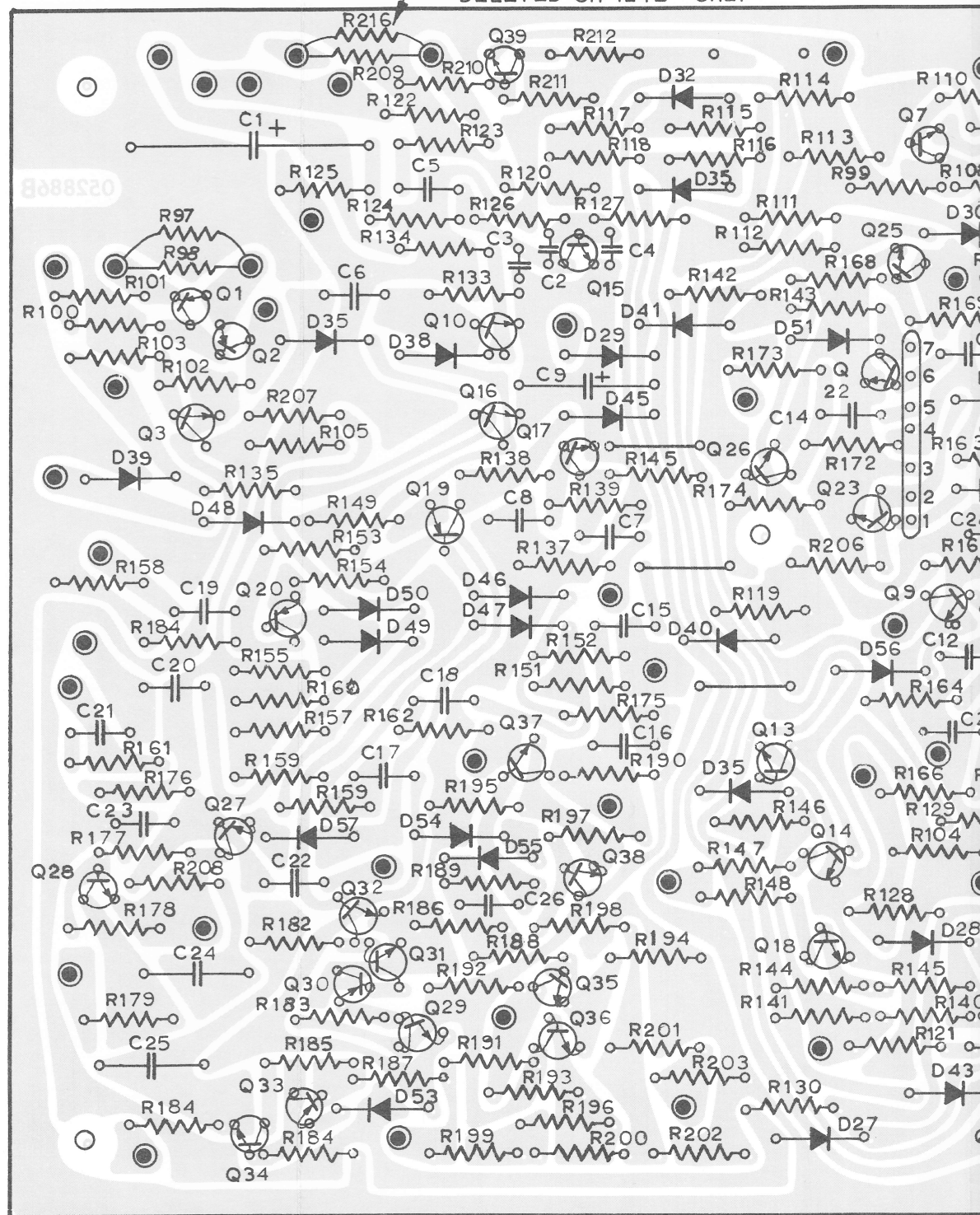
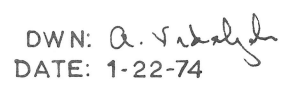
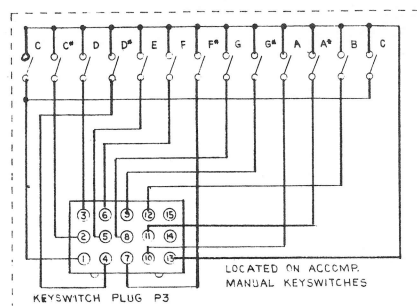


FIGURE 36A



DWN: A. Sabaly
DATE: 1-22-74



PIN	COLOR	FUNCTION
1	BLACK #22	GROUND
2	BROWN	TEMPO CONTROL
3	RED	SEE NOTE 6
4	ORANGE	"
5	YELLOW	"
6	GREEN	"
7	BLUE	"
8	VIOLET	"
9	GRAY	"
10	WHITE	"
11	PINK	"
12	LT. GREEN	"
13	S.C.S. #2	AUTO CHORD
14		
15	S.C.S. #1	PED. GATE DEFEAT

J3
KEYSWITCH SOCKET



J3 # P3 KEYSWITCH

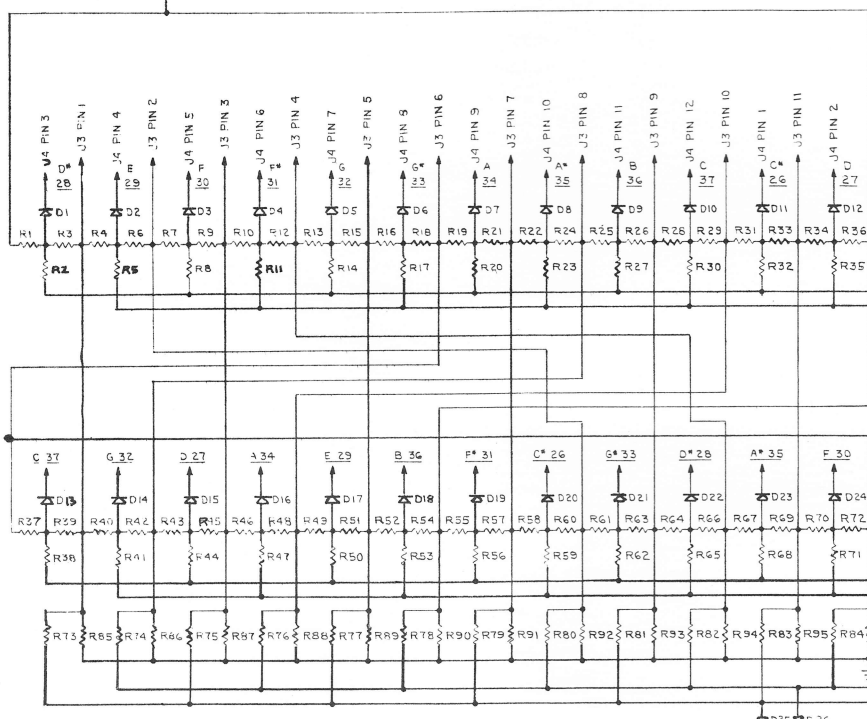
PIN	COLOR
1	BLACK
2	BROWN
3	RED
4	ORANGE
5	YELLOW
6	GREEN
7	BLUE
8	VIOLET
9	GRAY
10	WHITE
11	PINK
12	LT. GREEN
13	RED #1
14	
15	

J4
GENERATOR SOCKET



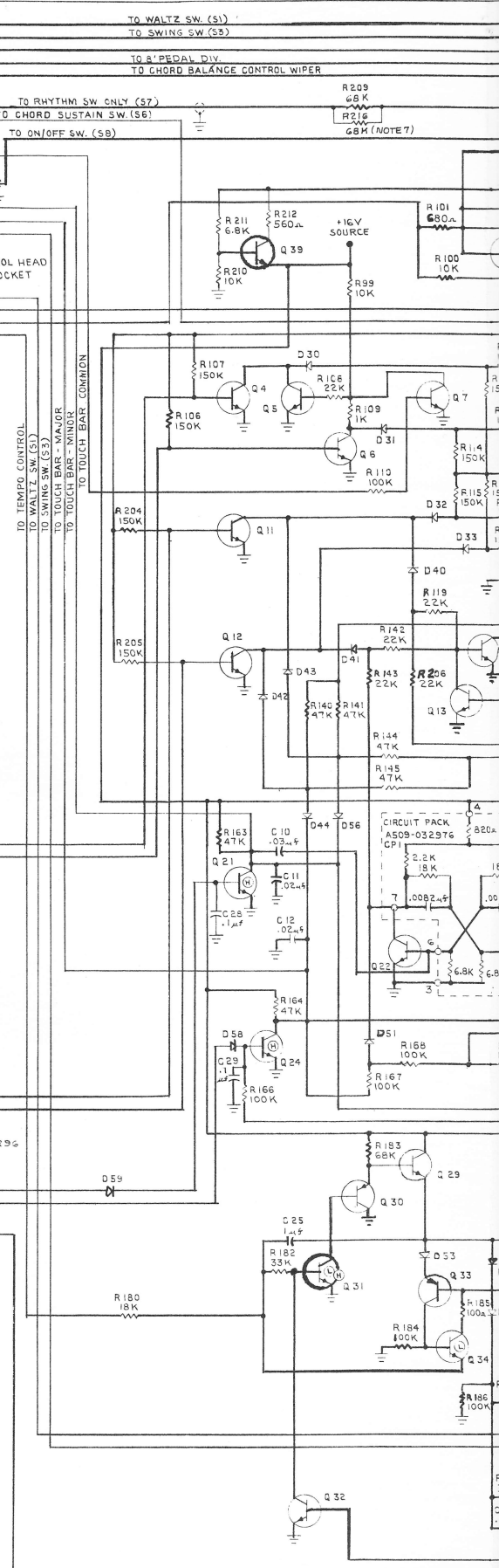
J4 GENERATOR

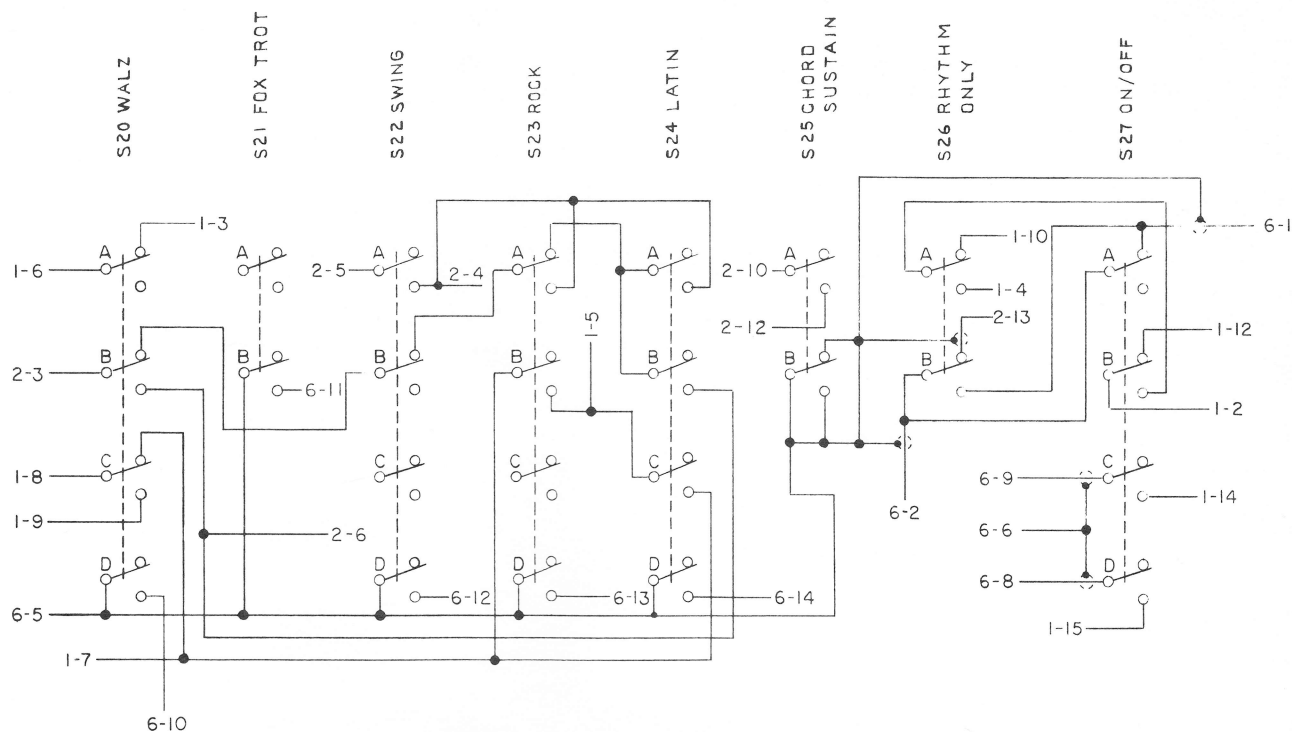
PIN	COLOR	FUNCTION
1	BROWN	C*
2	RED	D
3	ORANGE	D*
4	YELLOW	E
5	GREEN	F
6	BLUE	F*
7	VIOLET	G
8	GRAY	G*
9	WHITE	A
10	PINK	A*
11	LT. GREEN	B
12	BLACK	C
13	GRAY #2	TO ACC. BD.
14	S.C.S.	TO ACC. BD.
15	SHIELD	GROUND



NOTES:

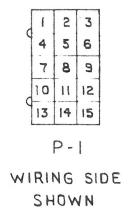
1. ALL RESISTORS ARE $\pm 10\%$ UNLESS OTHERWISE SPECIFIED.
2. RESISTORS R1 THRU R64 ARE 150K.
RESISTORS R65 THRU R96 ARE 10K.
3. RESISTORS R104 & R105 ARE SELECTED TO INSURE SATURATION OF Q2 WITH ANY TWO KEY SWITCHES CLOSED.
4. SELECT TRANSISTORS PER S429 AS INDICATED. Q2, Q3, Q5, Q20, Q21, Q29, Q32 & Q34 ARE PNP, A514-D44918. Q30 IS A514-D4782B.
5. THE POINTS LABELED WITH UNDERLINED NO'S HAVE LIKE NO'S CONNECTED. (NO'S ARE GENERATOR FREQUENCY NO'S)
6. REFERENCE CONTROL SCHEMATIC D501-052784 FOR 120.
REFERENCE CONTROL SCHEMATIC D501-053163 FOR 125.
7. R216 (68K) DELTED ON MODEL 124B ONLY.



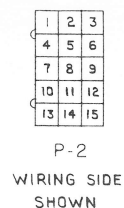


WONDER CHORD CONTROL HEAD CABLE #1

WONDER CHORD CONTROL HEAD CABLE #2



PIN	WIRE	FUNCTION
1	BROWN	TEMPO LIGHT
2	VIOLET #22	+28 V
3	ORANGE	SEE WONDER CHORD SCHEMATIC R501-053046
4	YELLOW	"
5	GREEN	"
6	BLUE	"
7	VIOLET	"
8	GRAY	"
9	WHITE	"
10	PINK	"
11		"
12	BLACK	SEE WONDER CHORD SCHEMATIC R501-053046
13		
14	YELLOW #1	AUTO PEDAL TRIG.
15	GREEN #1	AUTO ACCOMP. TRIG.



PIN	WIRE	FUNCTION
1	BLACK	GROUND
2	BROWN	TEMPO CONTROL
3	RED	SEE WONDER CHORD SCHEMATIC R501-053046
4	ORANGE	"
5	YELLOW	"
6	GREEN	"
7	BLUE	"
8	VIOLET	"
9	GRAY	"
10	WHITE	"
11		
12	LT. GREEN	SEE WONDER CHORD SCHEMATIC R501-053046
13	SH'L'D #2	AUTO CHORD
14		
15		

NOTES:

1. UNDERLINED NUMBERS (E.G. 2-9) INDICATE PLUG & PIN CONNECTIONS (E.G. PLUG 2 - PIN 9)
2. PLUGS 1 & 2 CONNECT TO COMPONENT BOARD & PLUG 6 CONNECTS TO TONE COLOR. REF. R501-053046.
3. ALL PUSH BUTTON SWITCHES SHOWN IN "OFF" POSITION.

RELEASED

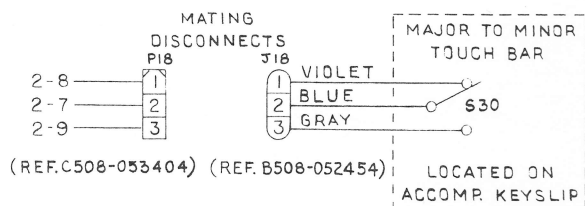
Ord. No. RN 597

Date 8-17-71

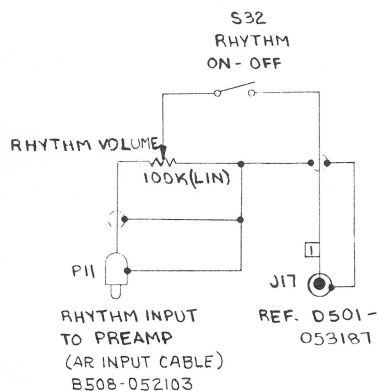
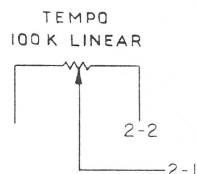
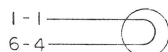
A ADDED S32

CN 14,632 CB 9-1-71

B ADDED AR INPUT CABLE
CN 14,633 D.D. 10-25-71



LAMP A514-048341



WONDER CHORD CONTROL TO TONE COLOR CABLE

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15

P-6

WIRING SIDE SHOWN

PIN	WIRE	FUNCTION
1	S.C.S. #4	FROM ACCOMP. HDR.
2	S.C.S.	TO ACCOMP. FILTERS
3		
4	RED	+53 V
5	BLACK #22	T.C. GROUND
6	BLACK #24	SHIELD GROUND
7		
8	S.C.S. #5	ACCOMP. TRIG. INPUT
9	S.C.S. #2	PEDAL TRIG. INPUT
10	BROWN	WALTZ R-P PATTERN
11	RED	FOX TROT " "
12	ORANGE	SWING " "
13	YELLOW	ROCK " "
14	GREEN	LATIN " "
15		" "

RECORD OF CHANGE

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WONDERCHORD MASTER CHART

PIN #	KEY	GENERATOR FREQ. & DIODE GATE				R	D58 (Q24)	D59 (Q21)	HEADER AMPLIFIER			
		ROOT	MIN	MAJ	5TH				Q4	Q6	Q11	Q12
1	C	C37 (D13)	D#-28 (D1)	E-29 (D2)	G32 (D14)	R73	ON	OFF	MIN	MAJ	ROOT	5TH
2	C#	C#-26 (D20)	E-29 (D2)	F-30 (D3)	G#-33 (D21)	R80	OFF	ON	MAJ	MIN	5TH	ROOT
3	D	D27 (D15)	F30 (D3)	F#31 (D4)	A34 (D16)	R75	ON	OFF	MIN	MAJ	ROOT	5TH
4	D#	D#-28 (D22)	F#-31 (D4)	G-32 (D5)	A#-35 (D23)	R82	OFF	ON	MAJ	MIN	5TH	ROOT
5	E	E29 (D17)	G32 (D5)	G#33 (D6)	B36 (D18)	R77	ON	OFF	MIN	MAJ	ROOT	5TH
6	F	F30 (D24)	G#-33 (D6)	A34 (D7)	C37 (D13)	R84	OFF	ON	MAJ	MIN	5TH	ROOT
7	F#	F#-31 (D19)	A34 (D7)	A#35 (D8)	C#26 (D28)	R79	ON	OFF	MIN	MAJ	ROOT	5TH
8	G	G32 (D14)	A#-35 (D8)	B36 (D9)	D27 (D15)	R74	OFF	ON	MAJ	MIN	5TH	ROOT
9	G#	G#-33 (D21)	B36 (D9)	C37 (D10)	D#-28 (D22)	R81	ON	OFF	MIN	MAJ	ROOT	5TH
10	A	A34 (D16)	C37 (D10)	C#26 (D11)	E29 (D17)	R76	OFF	ON	MAJ	MIN	5TH	ROOT
11	A#	A#-35 (D23)	C#-26 (D11)	D27 (D12)	F30 (D24)	R83	ON	OFF	MIN	MAJ	ROOT	5TH
12	B	B36 (D18)	D27 (D12)	D#28 (D1)	F#31 (D19)	R78	OFF	ON	MAJ	MIN	5TH	ROOT
1	C	Refer to "C" (Pin #1)										

Typical Example: Playing Key "C" (First line of chart) selects generator frequencies C-37, D#-28, E-29, and G-32 through diode gates D13, D1, D2 and D14, respectively. These represent the Root, Minor 3rd, Major 3rd and Fifth of "C". Positive voltage is applied by "R" (R73) via D58 to turn Q24 on. Header amplifiers Q4, Q6, Q11 and Q12 then carry the Minor, Major, Root and Fifth signals respectively.

WONDERCHORD

TRANSISTOR FUNCTIONS

Q1-Q2	Single Note Detector (Q2 is voltage source for Q19-20-27).
Q3	Voltage control for Q8-10-27-32.
Q4	Header Amplifier for Major or Minor Signal.
Q5	Inhibits Q4 when required (controlled by Q7).
Q6	Header amplifier for Major or Minor Signal.
Q7	Inhibits Q6 or Q5 when required (controlled by Q21-Q24).
Q8	Saturates organ pedal trigger amplifier in organ when in WonderChord mode, preventing normal pedal operation; and also voltage control for Q9.
Q9	Inhibits the organ Pedal Rhythm Trigger when in WonderChord mode. Also prevents charging of organ pedal sustain capacitor.
Q10	Discharges organ pedal sustain capacitor when going from WonderChord to organ mode.
Q11-Q12	Root-Fifth header amplifiers.
Q13	Inhibits Q14 when Chord Sustain button is depressed (pedal sounds continuously).
Q14	Carries Root-Fifth signals to organ 8' pedal divider when Chord Sustain button is not depressed.
Q15	Chord amplifier.
Q16	Inhibits the Pedal Transient Gate Q20 from operating the organ pedal gating transistor when WonderChord is in Rhythm only.
Q17	Automatic trigger for organ Accompaniment Rhythm Percussion.
Q18	Carries Root only to organ 8' pedal divider when Chord Sustain button is depressed.
Q19	Chord Transient Gate.
Q20	Pedal Transient Gate.
Q21	Control for Q7 and Q22.
Q22-Q23	Root-Fifth Flip-Flop.
Q24	Control for Q7 and Q23.
Q25	Controls Q27 (Tempo-light) in any rhythm except Waltz. Also inhibits Ramp Pulse #3 from the pedal gate on the first ramp, and every other ramp thereafter, in the Rock and Latin rhythms.
Q26	Changes state of Q22-Q23 (Root-Fifth Flip-Flop) when ramp resets, also operates Tempo Light Transient Gate Q27 when in Waltz mode.
Q27-Q28	Tempo Light Transient Gate.
Q29-Q30-Q31	Constant current generator for ramp. Q29 also produces #1 Ramp Pulse.
Q32	Ramp On-Off control.
Q33-Q34	Ramp reset
Q35-Q36	#3 Ramp Pulse Gates.
Q37-Q38	#2 Ramp Pulse Gates; also when ramp resets positive pulse operates Root-Fifth Flip-Flop gate Q26.
Q39	+16V source.
Q40	Disables Bass Guitar circuit from secondary triggering, when key released.

MODEL 124AC & 124BC ORGANS - GENERAL INFORMATION

The Model 124AC/124BC organs are the basic Model 124A/124B with a cassette recorder attached.

When a cassette is factory installed, the letter C is added to the model number, i.e., Model 124A becomes Model 124AC and Model 124B becomes Model 124BC.

Field installation is possible on 124B models only.



CASSETTE TAPE
PLAYER/ RECORDER

FIG. 37 — 124 BC ORGAN

N124 GENERAL INFORMATION

The Models N124A-AC and N124B-BC are electronically the same as the 124A-AC and 124B-BC models with the following exceptions:

1. General relocation of board assemblies as seen in Fig. 38.
2. On N124 models, one Tone Color Board Assembly contains circuits of the following 124 series board assemblies:
 - a. Preamplifier and Reverb Preamp Board Assembly.
 - b. Pedal and Accompaniment Filter Board Assembly.
 - c. Solo Filter Board Assembly
 - d. Muted Reed Assembly (On N124B-BC Only).
3. Reverb and Volume Level set controls are relocated to the Tone Color Board Assembly (See Fig. 42).
4. Fuse and fuseholder are employed instead of the circuit breaker.
5. "Prepared for" cables and components have been removed, i.e., cassette recorder and organ lab connections.
6. Pedal dust cover over pedal circuit assembly has been removed from N124 series organs.
7. For Tone Color Disassembly procedure for N124 series, refer to Fig. 42.

NOTE: This change occurred on all instruments starting with Serial No. 12266.

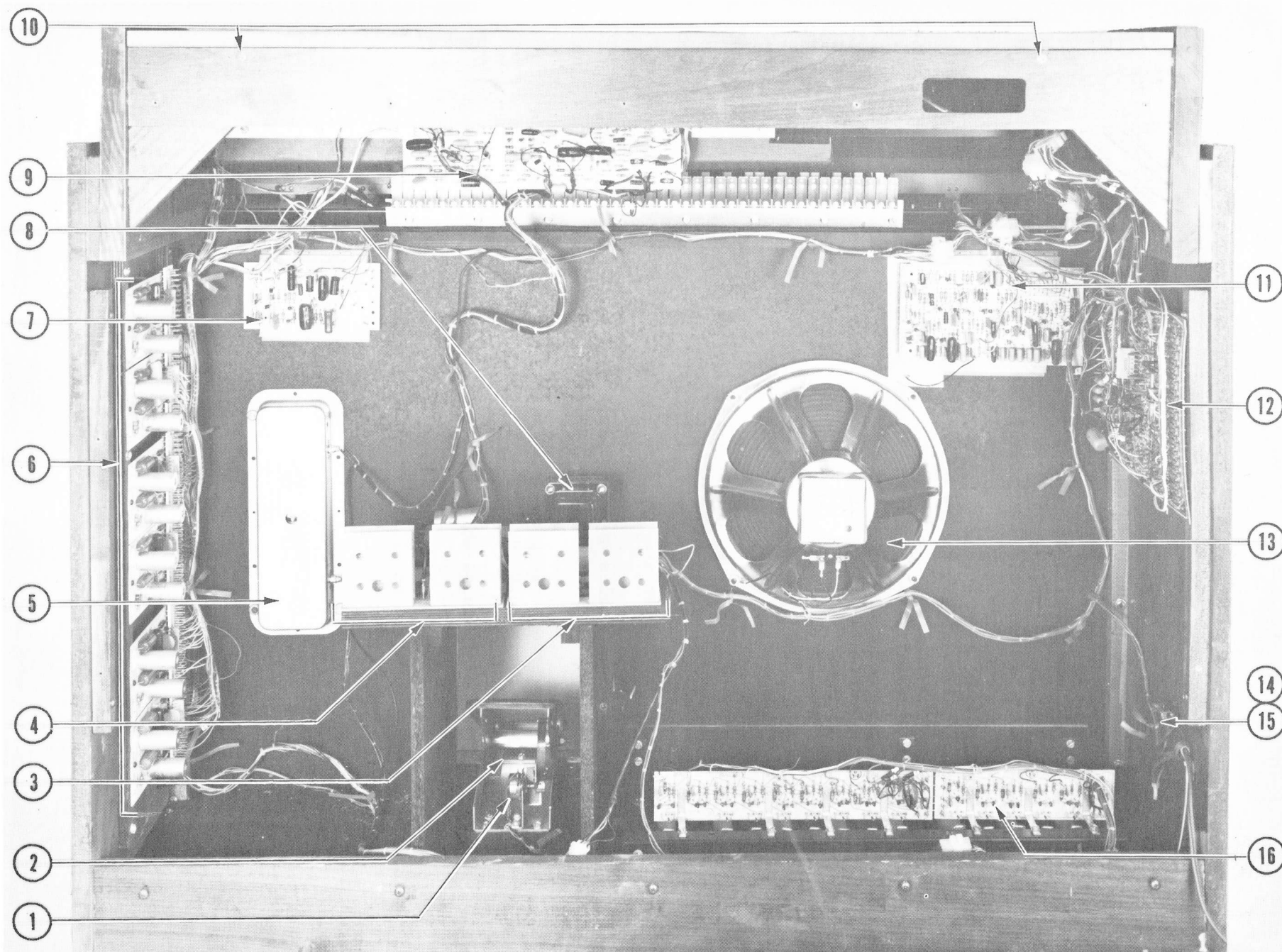


FIG. 38 — N124B ORGAN REAR VIEW (BACK REMOVED)

ITEM	DESCRIPTION FIG. 38	PART NUMBER
1.	POTENTIOMETER - 50k OHMS - 180° TAPER	B509-048890
2.	EXPRESSION PEDAL ASSEMBLY	D500-053250
3.	25W POWER AMPLIFIER ASSEMBLY	B500-051926
4.	POWER SUPPLY ASSEMBLY	B500-052958
5.	REVERB UNIT ASSEMBLY	D500-048516
6.	GENERATOR SHELF ASSEMBLY	SEE FIG. 39
7.	ACCESSORY BOARD ASSEMBLY (A & B-MODELS)	B500-053858
	(AC & BC-MODELS)	B500-053253
8.	POWER TRANSFORMER	C512-053438
9	TONE COLOR BOARD ASSEMBLY (N124A & AC MODELS)	C500-059781
	TONE COLOR BOARD ASSEMBLY (N124B & BC MODELS)	C500-059782
10.	SCREWS SECURING TOP LID ASSEMBLY	
11.	RHYTHM VOICE BOARD ASSEMBLY	C500-053499
12.	AUTO RHYTHM TRIGGER BOARD ASSEMBLY (N124A & AC MODELS)	C500-053634
	WONDERCHORD BOARD NO. 2 ASSEMBLY (N124B & BC MODELS)	C500-052888
13.	SPEAKER, 12" - 8 OHM	A513-024925
14.	FUSEHOLDER	A514-059976
15.	FUSE 2A - SLO-BLO	A514-032101
16.	13 NOTE PEDAL BOARD ASSEMBLY (N124A & AC MODELS)	D500-053456
	13 NOTE PEDAL BOARD ASSEMBLY (N124B & BC MODELS)	D500-053267

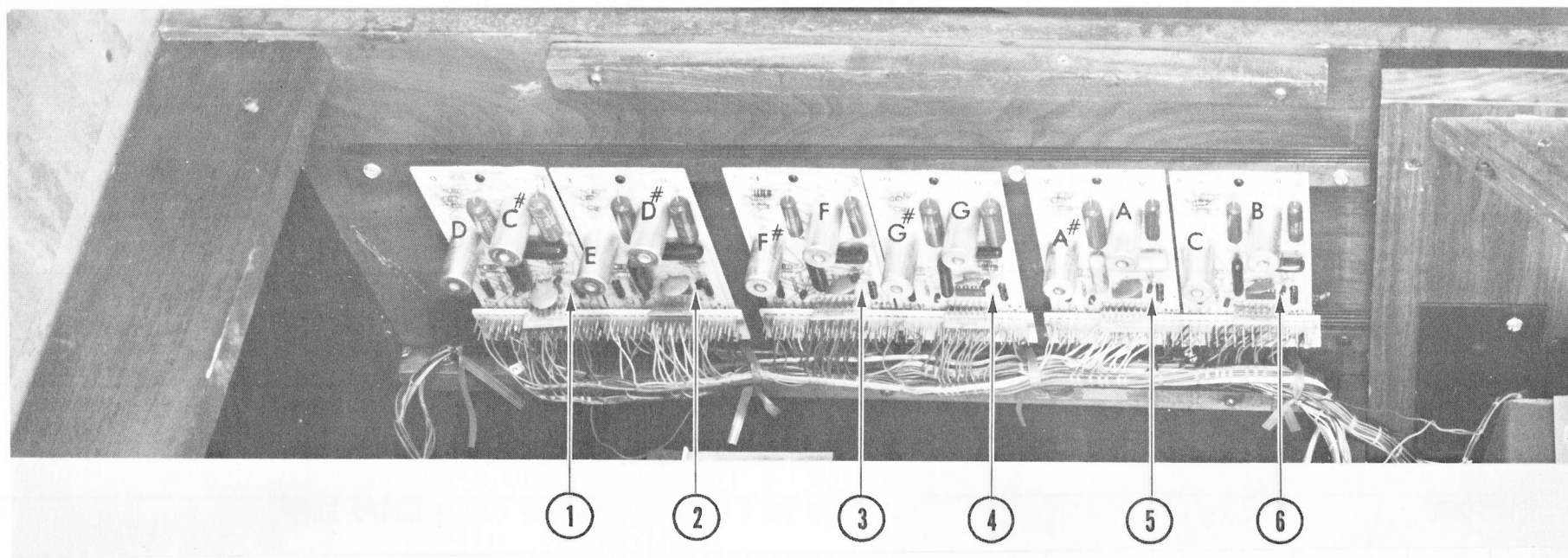


FIG. 39 - GENERATOR SHELF ASSEMBLY

ITEM	DESCRIPTION	PART NUMBER
1.	GENERATOR SUB ASSEMBLY #1 (C#-D)	X500-048697
2.	GENERATOR SUB ASSEMBLY #2 (D#-E)	X500-048698
3.	GENERATOR SUB ASSEMBLY #3 (F-F#)	X500-048699
4.	GENERATOR SUB ASSEMBLY #4 (G-G#)	X500-048700
5.	GENERATOR SUB ASSEMBLY #5 (A-A#)	X500-048701
6.	GENERATOR SUB ASSEMBLY #6 (B-C)	X500-048702

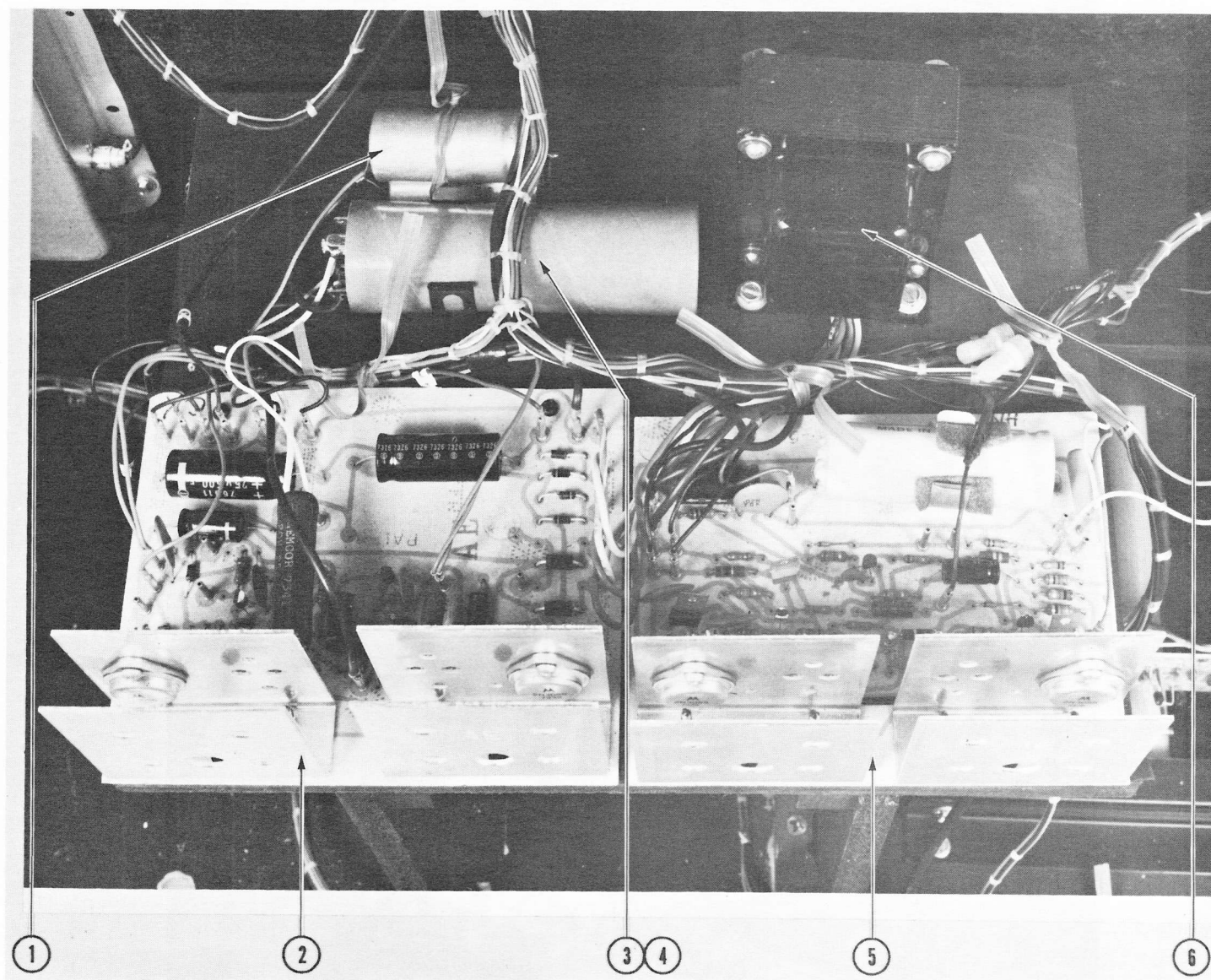


FIG. 40 - POWER SUPPLY & AMPLIFIER SHELF ASSEMBLY

ITEM	DESCRIPTION	PART NUMBER
1.	2000 MFD @ 60V	B517-047881
2.	POWER SUPPLY BOARD ASSEMBLY	B500-052958
3.	4000 MFD @ 60V	B517-038985
4.	CAPACITOR MOUNTING CLIP	A237-019612
5.	25W POWER AMPLIFIER ASSEMBLY	B500-051926
6	POWER TRANSFORMER	C512-053438

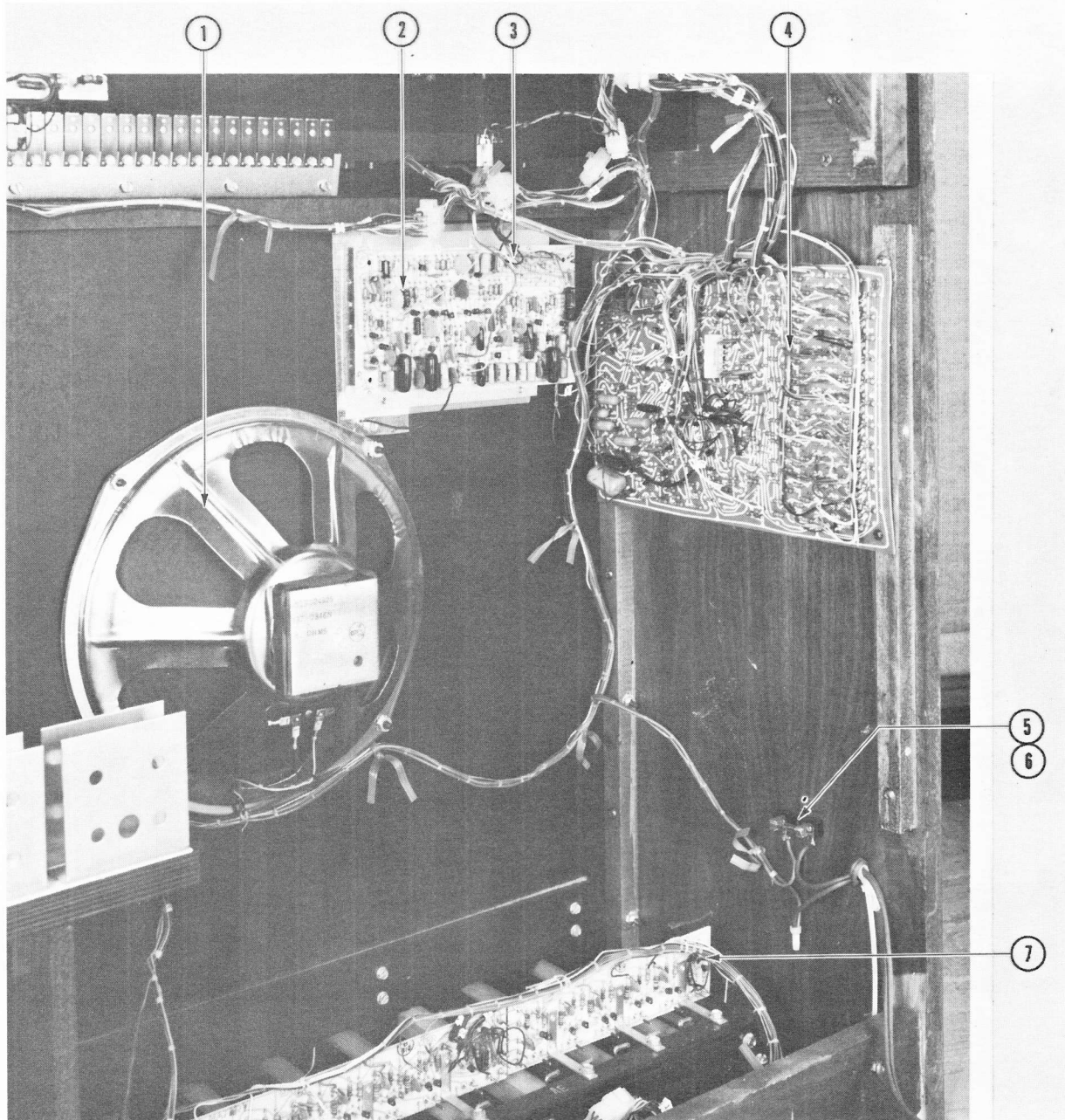


FIG. 41 - WONDERCHORD & VOICE BOARD ASSEMBLY (N124B & BC MODELS)

ITEM	DESCRIPTION	PART NUMBER
1.	SPEAKER, 12" - 8 OHM	A513-024925
2.	NOISE (BRUSH) LEVEL ADJUSTING MINIPOT	
3.	RHYTHM VOICE BOARD ASSEMBLY	C500-053499
4.	WONDERCHORD BOARD NO. 2 ASSEMBLY (N124B & BC MODELS)	C500-052888
	AUTO RHYTHM TRIGGER BOARD ASSEMBLY (N124A & AC MODELS)	C500-053634
5.	FUSEHOLDER	A514-059976
6.	FUSE, 2A - SLO-BLO	A514-032101
7.	13 NOTE PEDAL ASSEMBLY (N124 B & BC MODELS)	D500-059863
	13 NOTE PEDAL ASSEMBLY (N124A & AC MODELS)	D500-053456

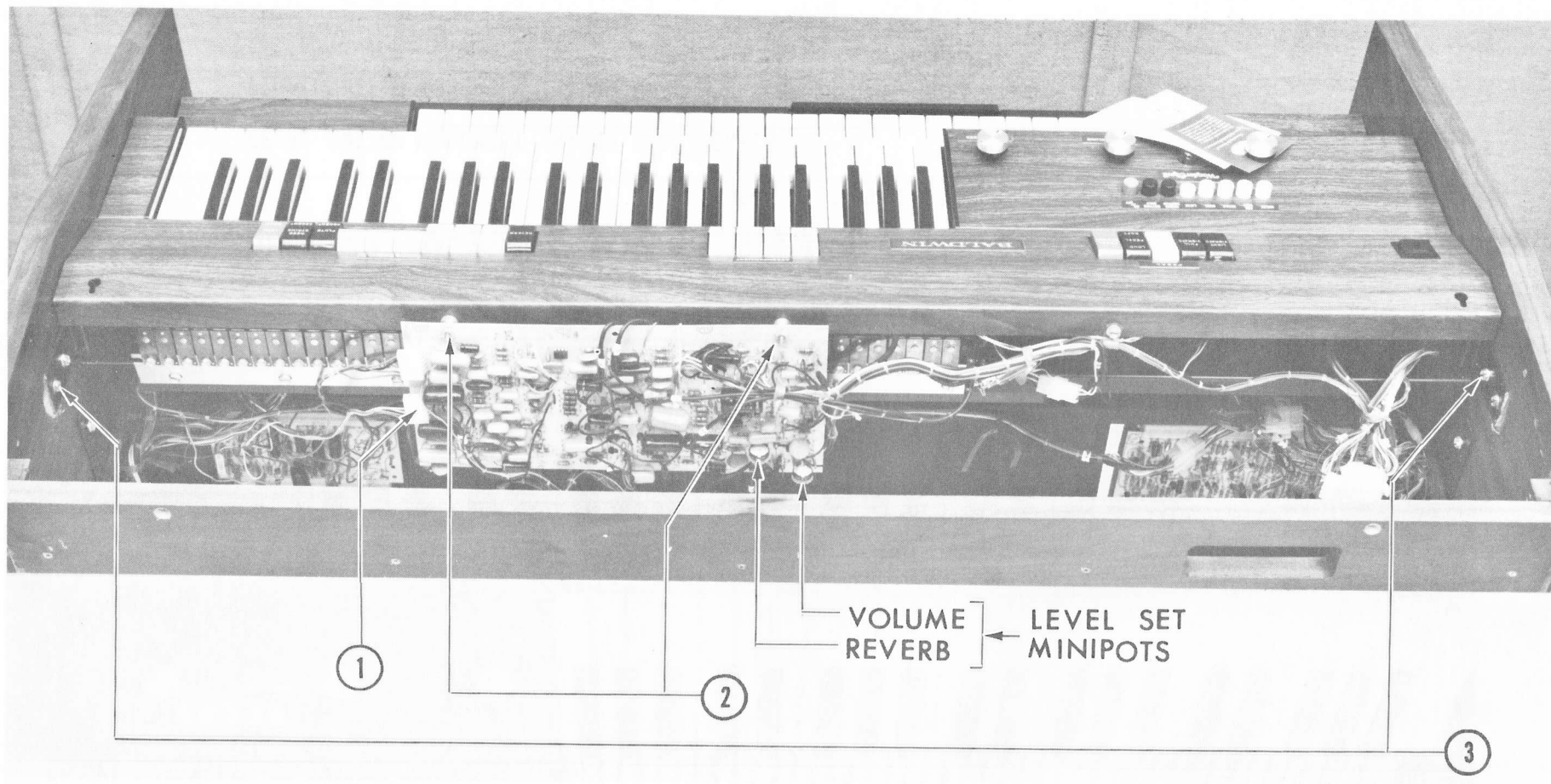


FIG. 42 - N124 ORGAN TOP VIEW

TONE COLOR DISASSEMBLY

TO RAISE TONE COLOR, REMOVE TONE COLOR BOARD ASSEMBLY ITEM (1) FROM BACK OF TONE COLOR BY REMOVING TWO NUTS ITEM (2) AND TWO SCREWS ITEM (3).

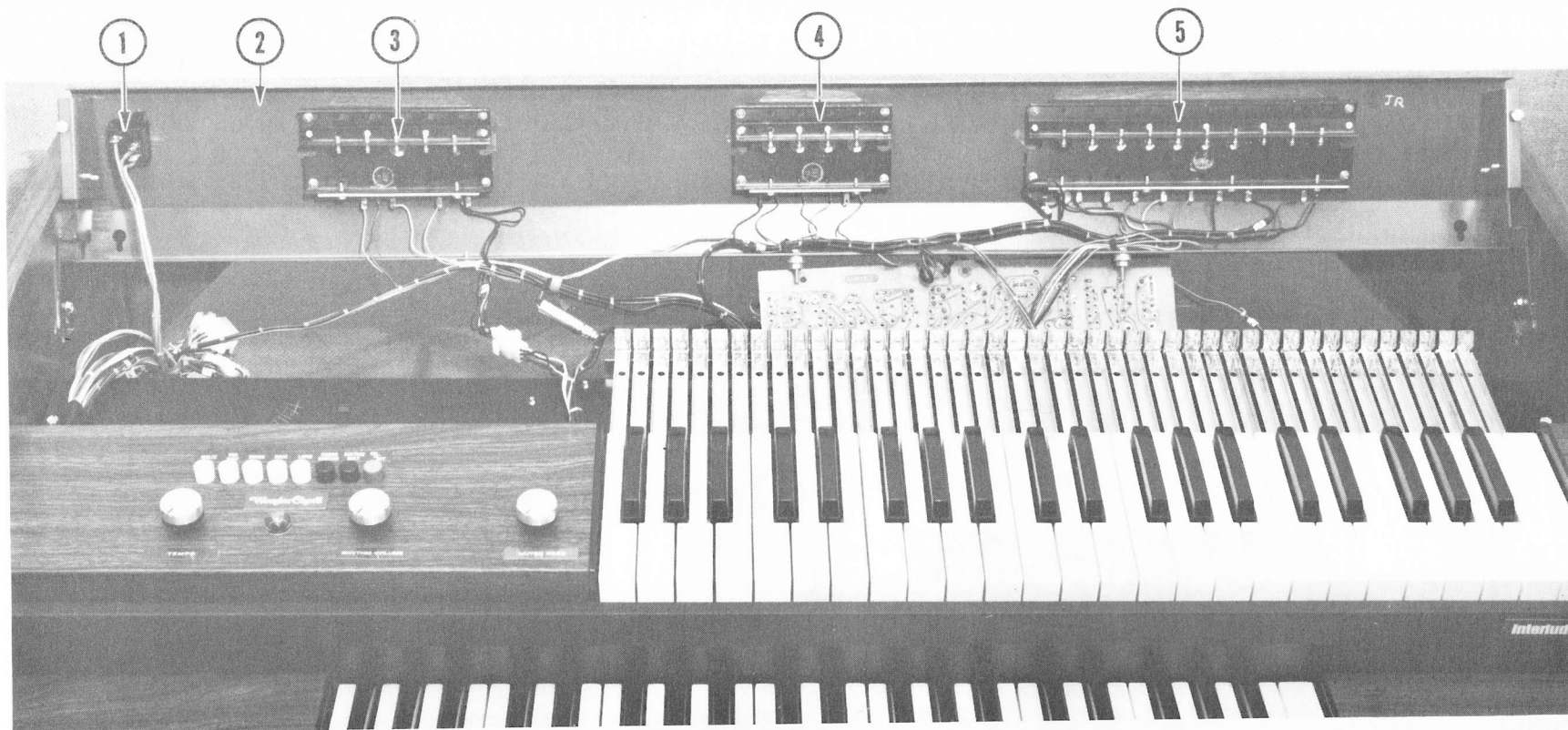


FIG. 43 - TONE COLOR RAISED (N124B & BC MODELS)

ITEM	DESCRIPTION	PART NUMBER
1.	POWER SWITCH - ROCKER	A506-058601
2.	TONE COLOR FINAL ASSEMBLY (N124 A & AC MODELS)	X500-059908
	(N124B & BC MODELS)	X500-059909
3.	PEDAL SWITCH ASSEMBLY (N124A & AC MODELS)	C500-053371
	PEDAL SWITCH ASSEMBLY (N124B & BC MODELS)	C500-053577
4.	ACCOMPANIMENT SWITCH ASSEMBLY	B500-053099
5.	SOLO SWITCH ASSEMBLY	C500-053286

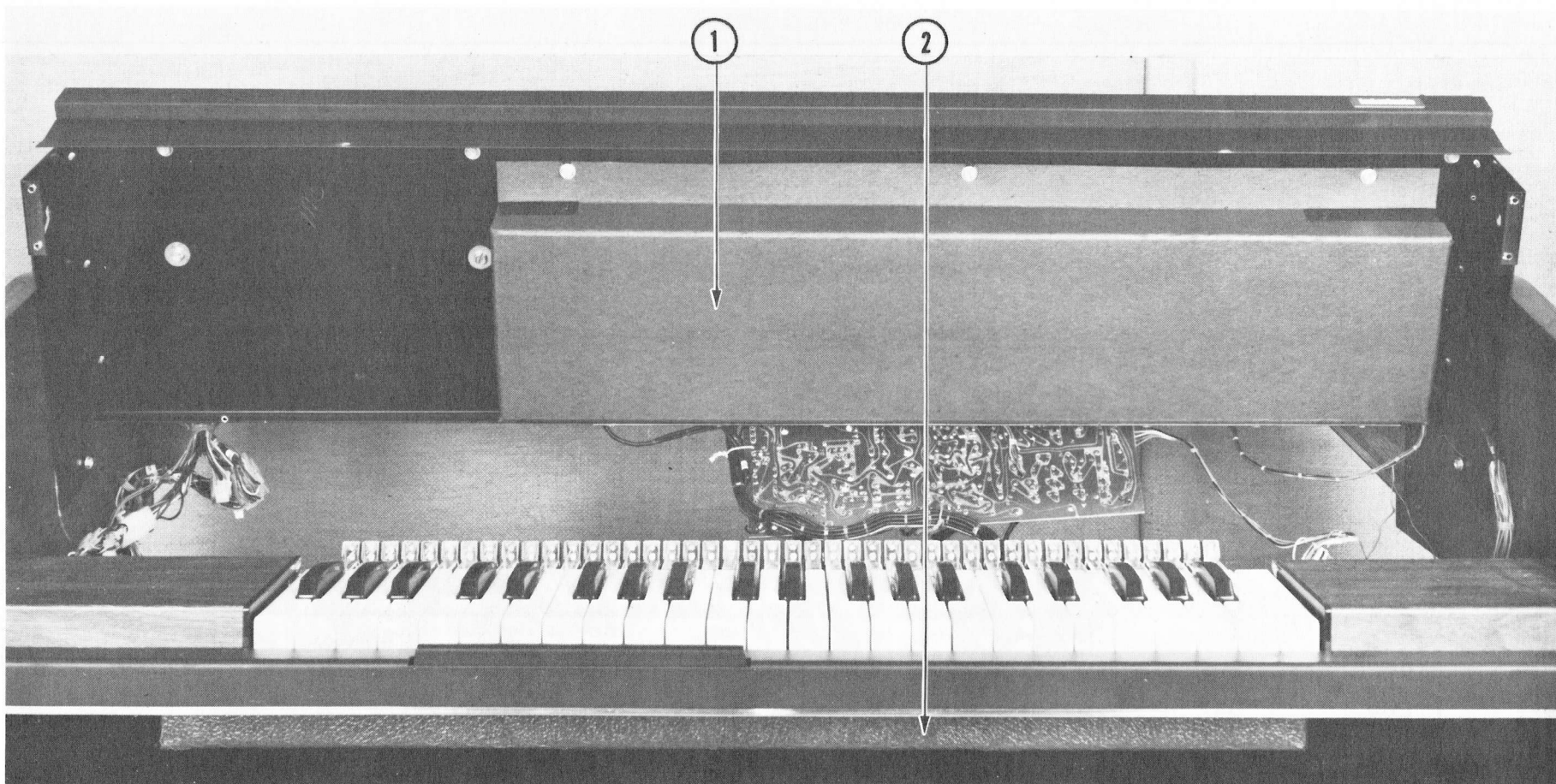


FIG. 44 - SOLO MANUAL RAISED

ITEM	DESCRIPTION	PART NUMBER
1.	MANUAL SWITCH COVER (SOLO)	D502-059544
2.	MANUAL SWITCH COVER (ACC.)	D502-052385

TONE COLOR BOARD ASSY. N124A(N \equiv C500-059781)
Schematic N \equiv D501-059837

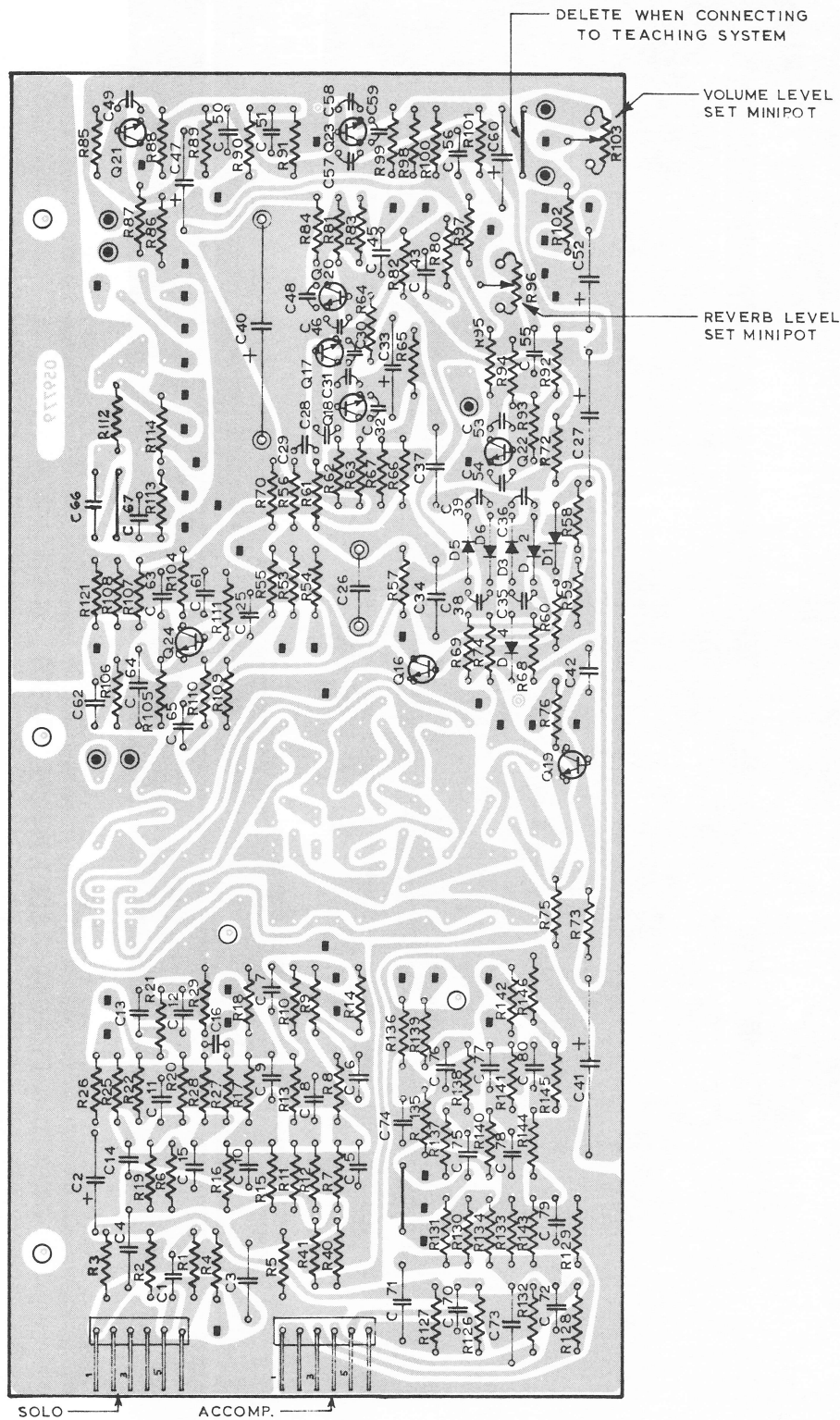


FIGURE 45

TONE COLOR BOARD ASSY. N124B(N \equiv C500-059782)
Schematic N \equiv D501-059837

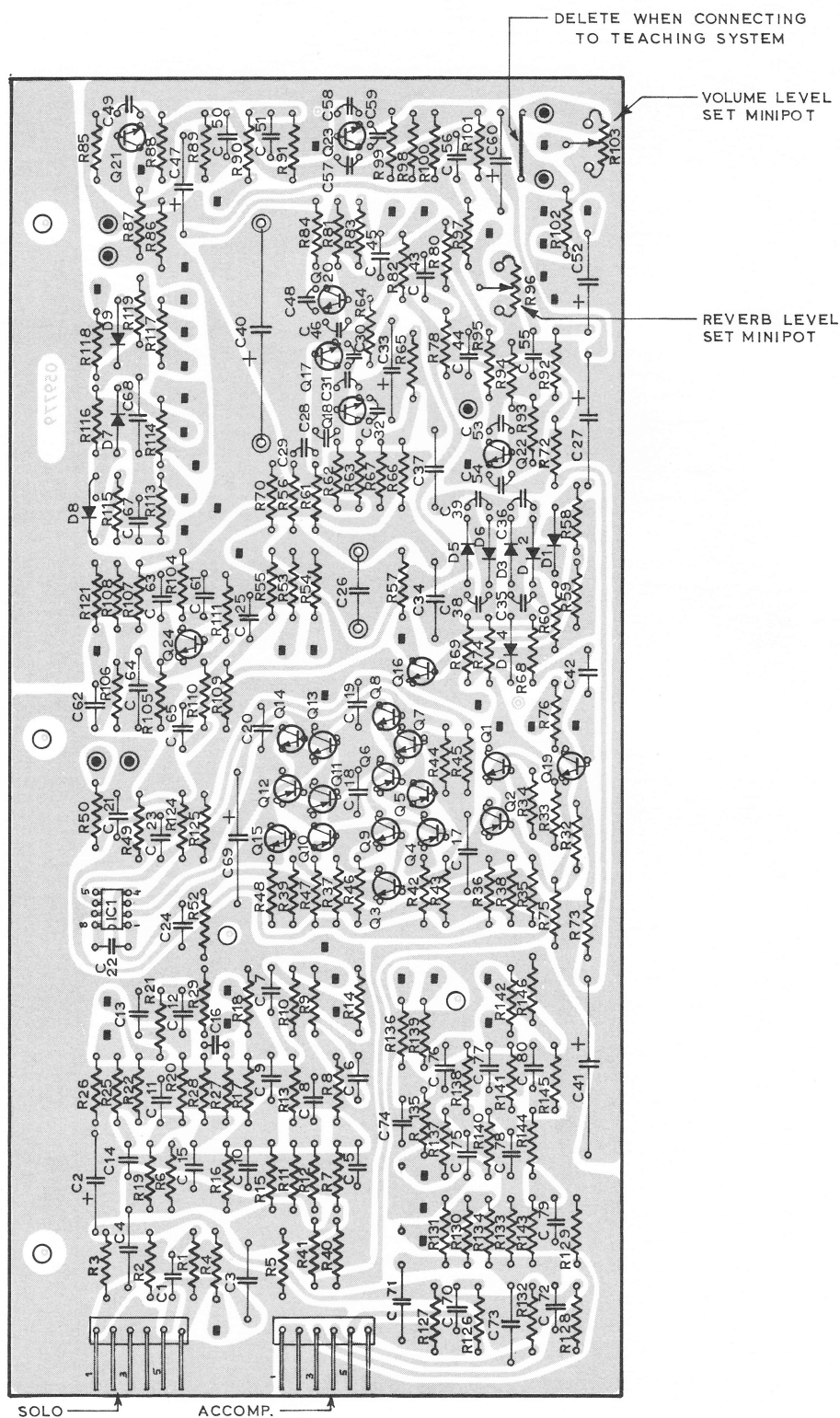
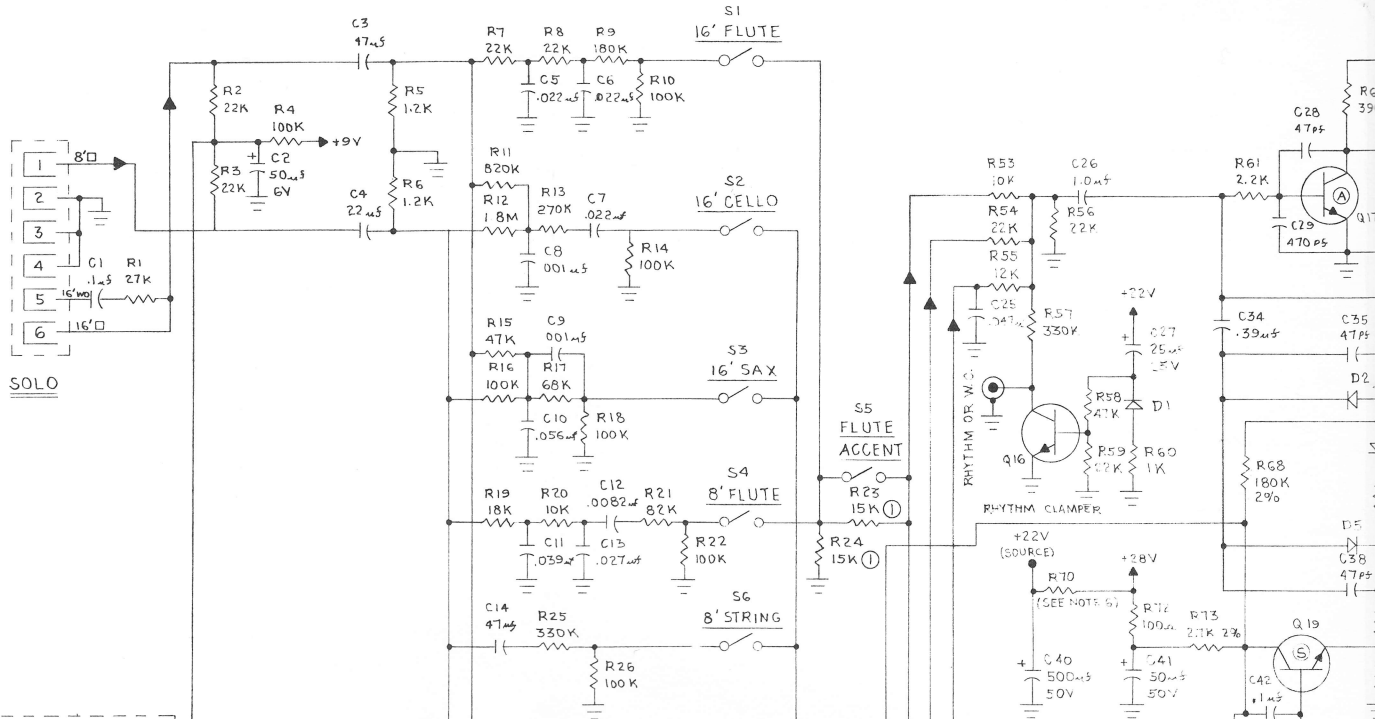


FIGURE 46



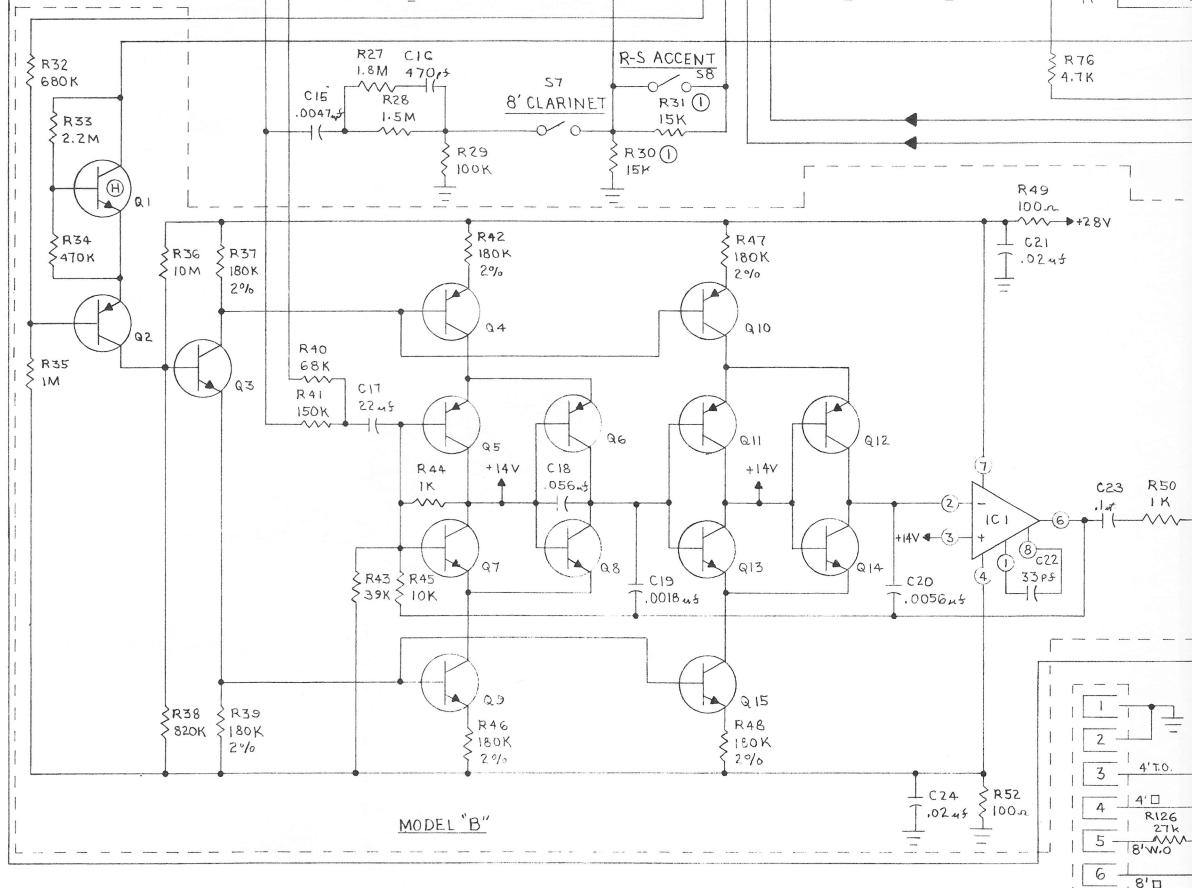
TONE COLOR BD. CABLE
MODEL "B"

PIN	WIRE	FUNCTION
1	RED	W.C. PED. GATE
2		
3		
4	VIOLET	+28V
5	BLACK	T.C. GND.
6	GRAY	P.S. GND.
7		
8		
9	YELLOW	PED. GATE DEF.

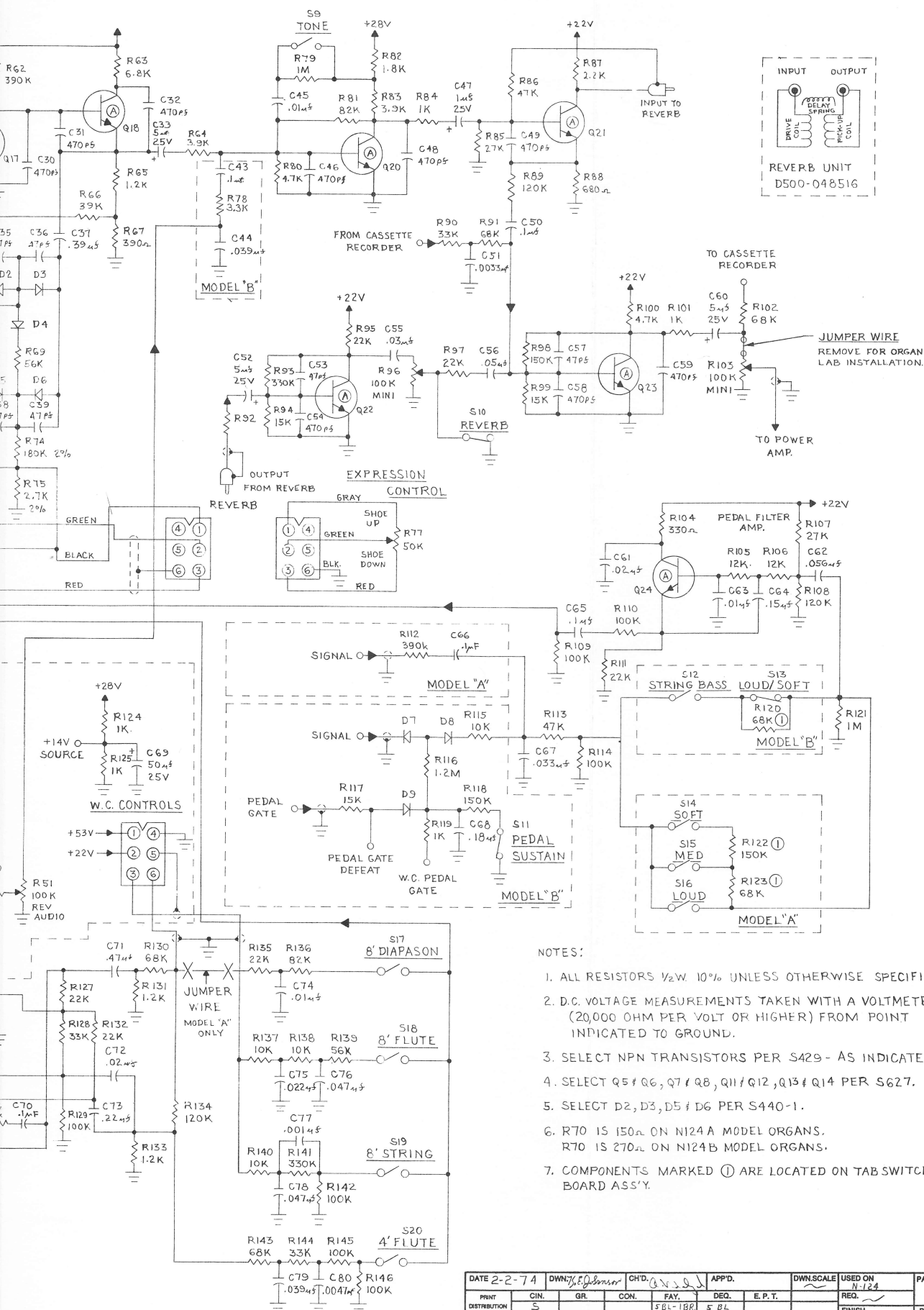
PIN	WIRE	FUNCTION
1	RED	+9V
2	VIOLET	+28V
3	BLACK	GND.
4		
5	BROWN	PED. GATE

TONE COLOR BD. CABLE
MODEL "A"

PIN	WIRE	FUNCTION
1		
2	ORANGE	+22V
3	GRAY	P.S. GND.
4	BLACK	T.C. GND.
5	WHITE	+53V
6		



ACCOMP.



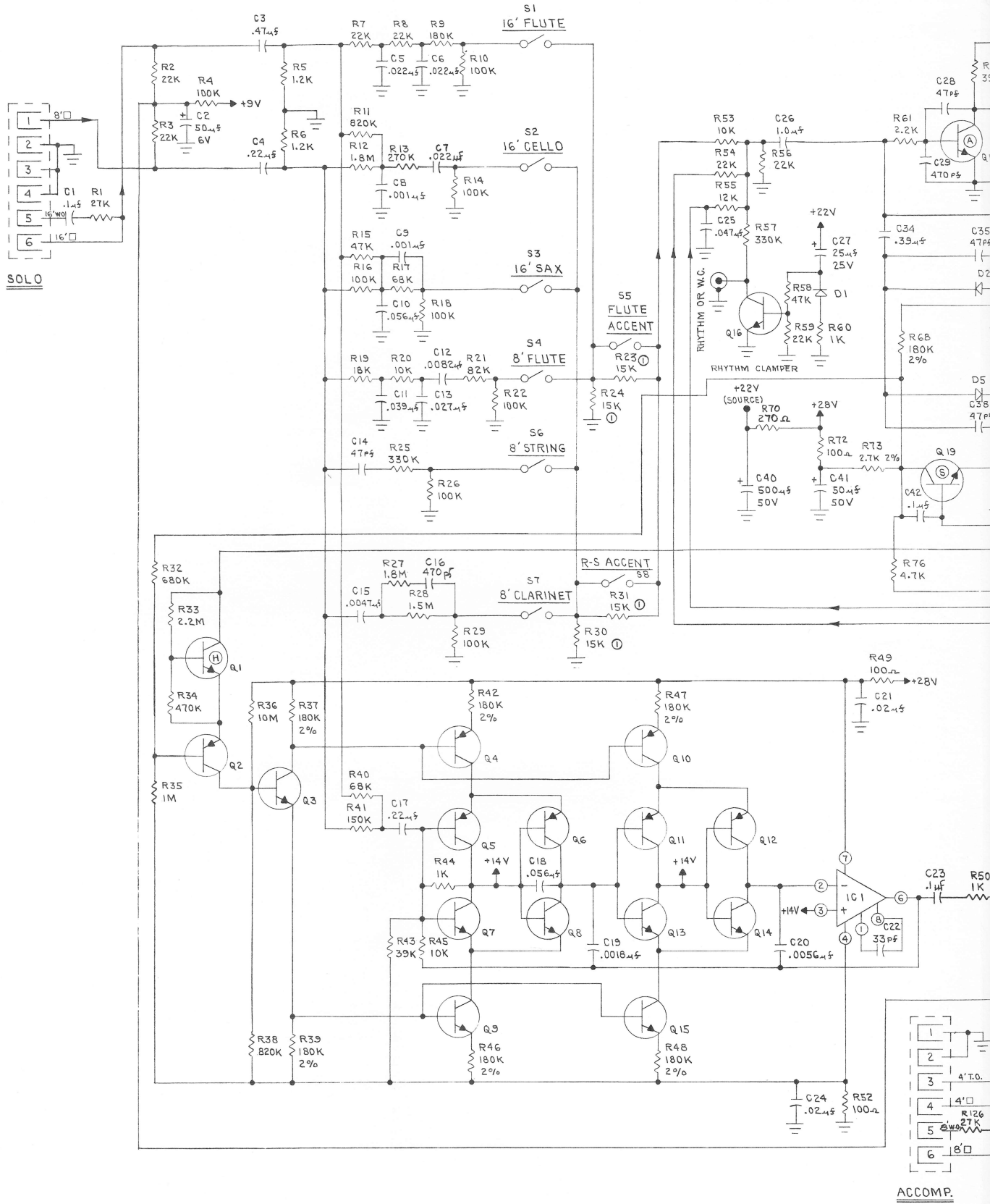
NOTES:

1. ALL RESISTORS $\frac{1}{2}W$ 10% UNLESS OTHERWISE SPECIFIED.
2. D.C. VOLTAGE MEASUREMENTS TAKEN WITH A VOLTMETER (20,000 OHM PER VOLT OR HIGHER) FROM POINT INDICATED TO GROUND.
3. SELECT NPN TRANSISTORS PER S429 - AS INDICATED.
4. SELECT Q5, Q6, Q7, Q8, Q11, Q12, Q13, Q14 PER S627.
5. SELECT D2, D3, D5, D6 PER S440-1.
6. R70 IS 150 Ω ON N124A MODEL ORGANS.
R70 IS 270 Ω ON N124B MODEL ORGANS.
7. COMPONENTS MARKED ① ARE LOCATED ON TAB SWITCH BOARD ASS'Y.

LAST USED

R146
C80
Q24
D9
S20

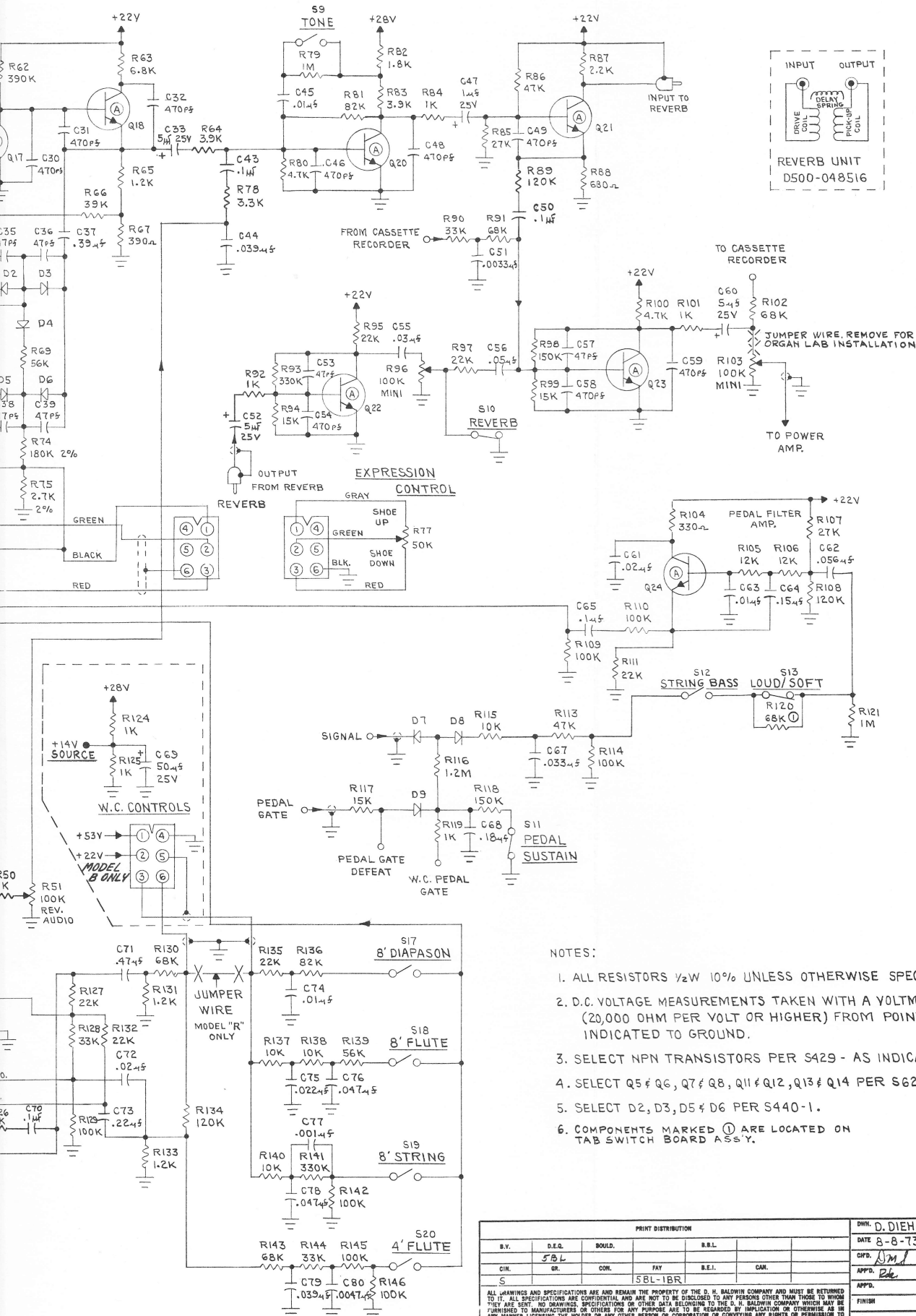
DATE 2-2-74	DWN: J. E. Brown	CHD: G. N. S. S.	APPD.	DWN: SCALE	USED ON N-124	PART NAME
PNT DISTRIBUTION	CIN.	GR.	CON.	FAY.	DEQ.	E. P. T.
S				FBL-18R		5 BL
FINISH				BM503-N124-19		GR.
NEXT ASSEM.				SUPERSEDES		REV.
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO						D 501-059837



RELEASED

Ord. No. RN 645
Date 8-23-73

(A) REVISED TO BE USED WITH REAL RHYTHM (N124) CN15,599 10-18-73 JCD
(B) REVISED PER TECH. SERVICE REQUEST. CN15,708-2-A-74 G. CAPURRO
(C) REVISED PER THIS CHANGE NOTICE. G.N. 15,870 5-30-74 W.R.M.



NOTES:

1. ALL RESISTORS 1/2W 10% UNLESS OTHERWISE SPECIFIED.
2. D.C. VOLTAGE MEASUREMENTS TAKEN WITH A VOLTMETER (20,000 OHM PER VOLT OR HIGHER) FROM POINT INDICATED TO GROUND.
3. SELECT NPN TRANSISTORS PER S429 - AS INDICATED.
4. SELECT Q5, Q6, Q7, Q8, Q11, Q12, Q13, Q14 PER S627.
5. SELECT D2, D3, D5, D6 PER S440-1.
6. COMPONENTS MARKED ① ARE LOCATED ON TAB SWITCH BOARD ASS'Y.

LAST USED

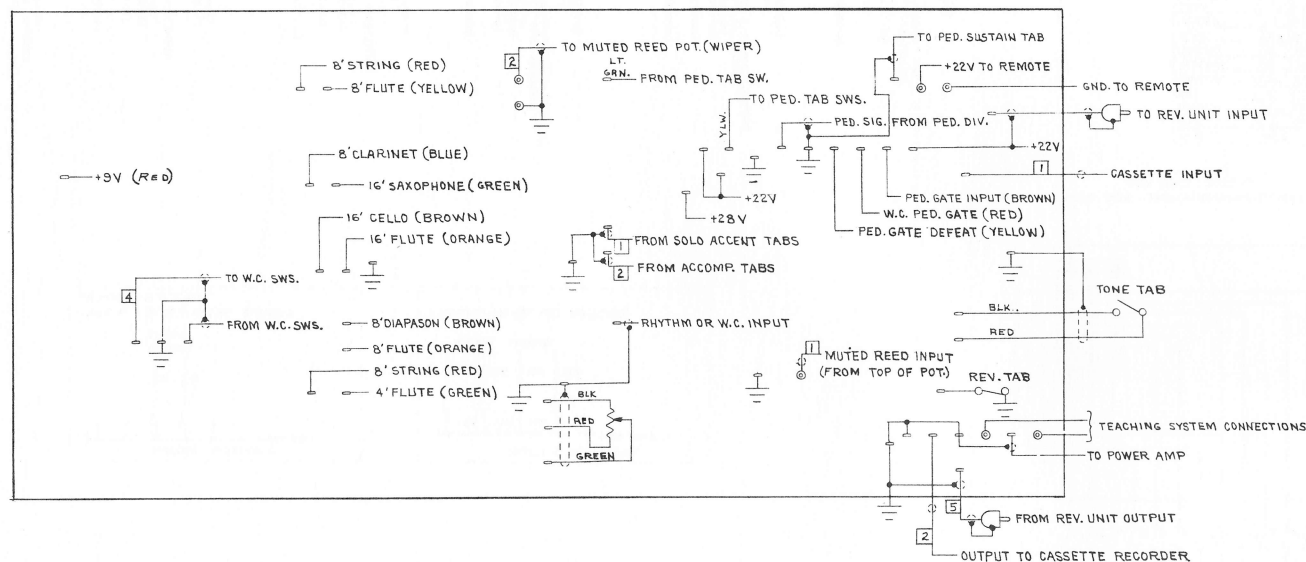
R146
C80
Q24
D5
S20

RECORD OF CHANGE

PRINT DISTRIBUTION						DWN. D. DIEHL		PART NAME	
S.Y.	D.E.G.	BOUL.	B.R.L.			DATE		TONE COLOR BD. ~ SCHEMATIC	
						8-8-73			
CIR.	GR.	CON.	FAY	B.E.I.	CAN.			S/N 503-N124-19 OR. IT.	
S			5BL-1BR					USED ON ORGAN N124A & B	
ALL DRAWINGS AND SPECIFICATIONS ARE AND REMAIN THE PROPERTY OF THE D. H. BALDWIN COMPANY AND MUST BE RETURNED TO IT. ALL SPECIFICATIONS ARE CONFIDENTIAL AND ARE NOT TO BE DISCLOSED TO ANY PERSONS OTHER THAN THOSE TO WHOM THEY ARE SENT. NO DRAWINGS, SPECIFICATIONS OR OTHER DATA BELONGING TO THE D. H. BALDWIN COMPANY WHICH MAY BE FURNISHED TO MANUFACTURERS OR OTHERS FOR ANY PURPOSE ARE TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION OR CONVERTING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.						APP'D. <i>[Signature]</i>		DWN. SCALE	
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:						FINISH		NEXT ASSEMB.	
DECIMAL ± .005						RSL		SUPERSEDES	
FRACTIONAL ± .015						D. H. BALDWIN CO. CINCINNATI, OHIO		REV.	
ANGLE ± 16°						D 501-059837		C	

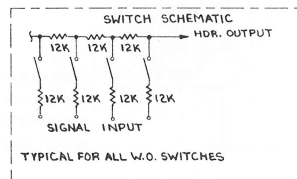
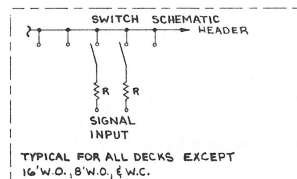
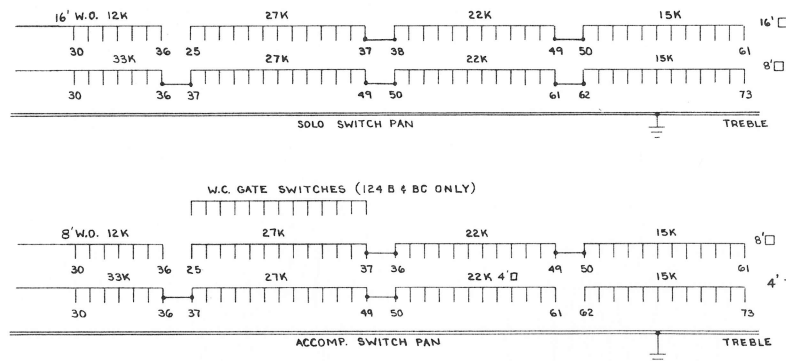
RELEASED

Ord. No. RN 645
Date 8-23-73



RECORD OF CHANGE

PRINT DISTRIBUTION						DWN. D. DIEHL		PART NAME	
B.V.	B.E.A.	BOUL.	B.S.L.			DATE	8-13-73	TONE COLOR BD. - WIR. DIA.	
COR.	GR.	COR.	FAT	S.E.I.	CAL.	CNV.	DML	B/M 503-N124-12 BL-NOTED IT.	
S			5BL-1BR			APP.	Eak	USED ON ORGAN N124	
ALL DRAWINGS AND SPECIFICATIONS ARE AND REMAIN THE PROPERTY OF THE D. H. BALDWIN COMPANY AND MUST BE RETURNED TO IT. ALL SPECIFICATIONS ARE CONFIDENTIAL AND ARE NOT TO BE DISCLOSED TO ANY PERSON OTHER THAN THOSE TO WHOM THEY ARE SENT. NO DRAWINGS, SPECIFICATIONS OR OTHER DATA BELONGING TO THE D. H. BALDWIN COMPANY WHICH MAY BE FURNISHED TO MANUFACTURERS OR OTHERS FOR ANY PURPOSE ARE TO BE REPRODUCED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION OR COMPETING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THEREIN.						DWN. SCALE		NEXT ASSEMB.	
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL: ± .005 FRACTIONAL: ± .015 ANGLE: ± 14°						FINISH		SUPERSEDES	
D. H. BALDWIN CO. CINCINNATI, OHIO						C		501-059783	



CROSSWIRE: SOLO
1.30 THRU 49 ON 16' □ TO 30 THRU 49 ON 8' □.
2.50 THRU 61 ON 8' □ TO 50 THRU 61 ON 16' □
3. BARE WIRE 30 THRU 36 ON 16' □ W.O. TO 30 THRU 36 ON 8' □.

CROSSWIRE: ACCOMPANIMENT
1.30 THRU 61 ON 4' □ TO 30 THRU 61 ON 8' □.

CABLE CONNECTIONS:
1. GENERATOR SIGNAL CABLE (SOLO) D508-059725
49 CONNECTIONS - 25 THRU 61 ON 16' □, AND 62 THRU 73 ON 4' 8' □ TO GEN. CONN. STRIP.
2. GENERATOR SIGNAL CABLE (ACCOMPANIMENT) D508-059726
49 CONNECTIONS - 25 THRU 61 ON 8' □, AND 62 THRU 73 ON 4' □ TO GEN. CONN. STRIP.
3. GENERATOR SIGNAL CABLE (PEDAL)
13 CONNECTIONS - 25 THRU 37 ON GEN. CONN. STRIP.
4. ACCOMPANIMENT GATE TO WONDER CHORD CABLE (124 B & BC ONLY)
14 CONNECTIONS - TO WONDERCHORD GATE SW. BD. (C508-059731)
5. SOLO HEADER CABLE C508-059732 (SEE CHART).
6. ACCOMP. HEADER CABLE C508-059734 (SEE CHART).

SOLO HEADER CONNECTIONS

1 2 3 4 5 6

G-PIN KONEKTCOM
PLUG SIDE SHOWN

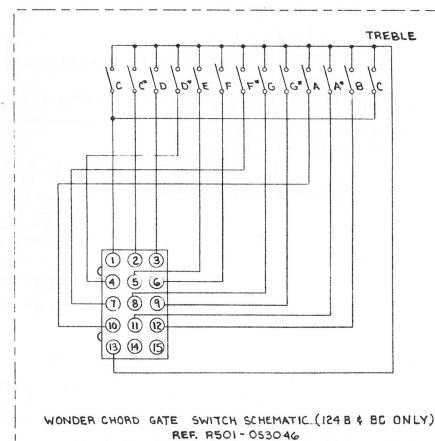
PIN	WIRE	FUNCTION
1	BROWN	8' □
2	BLACK	GND.
3		
4		
5	BROWN	16' W.O.
6	BLUE	8' □

ACCOMP. HEADER CONNECTIONS

1 2 3 4 5 6

6-PIN KONEKTCOM
PLUG SIDE SHOWN

PIN	WIRE	FUNCTION
1	BLACK	GND.
2		
3	PINK	4' TO HDR.
4	YELLOW	4' □ HDR.
5	BLUE	8' W.O.
6	GRAY	8' □ HDR.



COLOR	NOTE	NUMBER
BLACK	C	25 37 49 61 73
BROWN	C*	26 38 50 62
RED	D	27 39 51 63
ORANGE	D*	28 40 52 64
YELLOW	E	29 41 53 65
GREEN	F	30 42 54 66
BLUE	F*	31 43 55 67
VIOLET	G	32 44 56 68
GRAY	G*	33 45 57 69
WHITE	A	34 46 58 70
PINK	A*	35 47 59 71
LT. GREEN	B	36 48 60 72

DATE	BY	REVISION
8-15-73	W. H. BALDWIN	1
8-15-73	W. H. BALDWIN	2
8-15-73	W. H. BALDWIN	3
8-15-73	W. H. BALDWIN	4
8-15-73	W. H. BALDWIN	5
8-15-73	W. H. BALDWIN	6
8-15-73	W. H. BALDWIN	7
8-15-73	W. H. BALDWIN	8
8-15-73	W. H. BALDWIN	9
8-15-73	W. H. BALDWIN	10

RECORD OF CHANGE

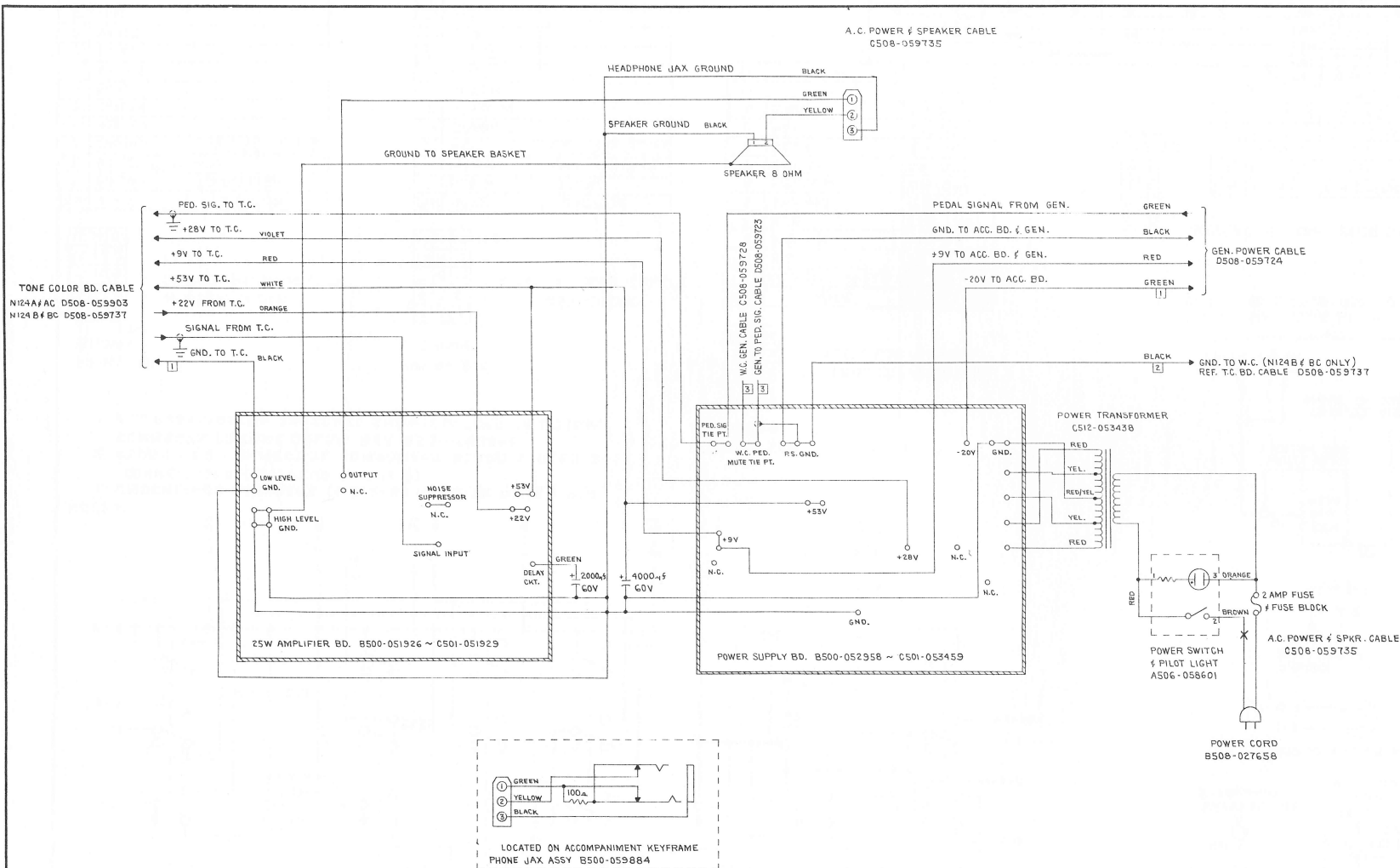
SWITCH WIRING DIAGRAM

ORGAN M124 A, AC, D & BC

D. H. BALDWIN CO. CINCINNATI, OHIO

D 501-059880

D 501-059880



RELEASED

Ord. No. RN 645
Date 3-7-73

RECORD OF CHANGE

PART DISTRIBUTION					REV. DATE	
BY	REL	ORAL	REL	REL	REV	DATE
5BL					1	8-28-73
5					2	8-28-73
5BL-1BR					3	8-28-73
5BL-1BR					4	8-28-73
5BL-1BR					5	8-28-73
5BL-1BR					6	8-28-73
5BL-1BR					7	8-28-73
5BL-1BR					8	8-28-73
5BL-1BR					9	8-28-73
5BL-1BR					10	8-28-73
5BL-1BR					11	8-28-73
5BL-1BR					12	8-28-73
5BL-1BR					13	8-28-73
5BL-1BR					14	8-28-73
5BL-1BR					15	8-28-73
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5BL-1BR					17	8-28-73
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5BL-1BR					19	8-28-73
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5BL-1BR					24	8-28-73
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5BL-1BR					28	8-28-73
5BL-1BR					29	8-28-73
5BL-1BR					30	8-28-73
5BL-1BR					31	8-28-73
5BL-1BR					32	8-28-73
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5BL-1BR					39	8-28-73
5BL-1BR					40	8-28-73
5BL-1BR					41	8-28-73
5BL-1BR					42	8-28-73
5BL-1BR					43	8-28-73
5BL-1BR					44	8-28-73
5BL-1BR					45	8-28-73
5BL-1BR					46	8-28-73
5BL-1BR					47	8-28-73
5BL-1BR					48	8-28-73
5BL-1BR					49	8-28-73
5BL-1BR					50	8-28-73
5BL-1BR					51	8-28-73
5BL-1BR					52	8-28-73
5BL-1BR					53	8-28-73
5BL-1BR					54	8-28-73
5BL-1BR					55	8-28-73
5BL-1BR					56	8-28-73
5BL-1BR					57	8-28-73
5BL-1BR					58	8-28-73
5BL-1BR					59	8-28-73
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5BL-1BR					97	8-28-73
5BL-1BR					98	8-28-73
5BL-1BR					99	8-28-73
5BL-1BR					100	8-28-73

POWER CIRCUIT DIAGRAM

REV. 503-N124-2 RE. NOTED JC.

ORGAN N124

REV. 503-N124-2 RE. NOTED JC.

REV. 503-N124-2 RE. NOTED JC.

REV. 503-N124-2 RE. NOTED JC.

REV. 503-N124-2 RE. NOTED JC.

REV. 503-N124-2 RE. NOTED JC.

REV. 503-N124-2 RE. NOTED JC.

REV. 503-N124-2 RE. NOTED JC.

REV. 503-N124-2 RE. NOTED JC.

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REV. 503-N124-2 RE. NOTED JC.

REV. 503-N124-2 RE. NOTED JC.

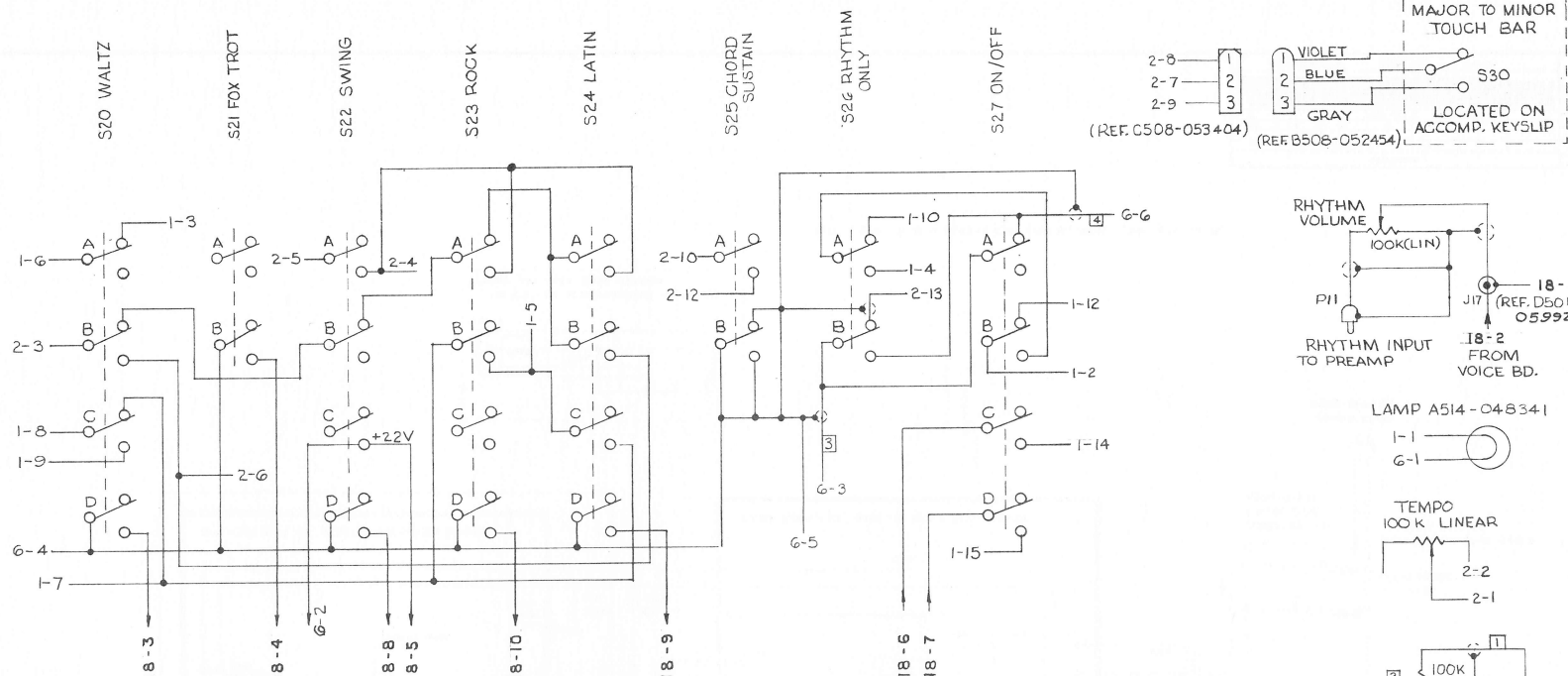
REV. 503-N124-2 RE. NOTED JC.

REV. 503-N124-2 RE. NOTED JC.

RELEASED

Ord. No. R.N. G 45

Date 8-23-73

A ADDED DISCONNECT P.18.
C.N. 15,686 1-10-74 W.R.M.

NOTES:

1. UNDERLINED NUMBERS (E.G. 2-9) INDICATE PLUG & PIN CONNECTIONS (E.G. PLUG 2 - PIN 9).
2. PLUGS 1 & 2 CONNECT TO COMPONENT BOARD & PLUG 6 CONNECTS TO TONE COLOR REF. R501-053046.
3. ALL PUSH BUTTON SWITCHES SHOWN IN "OFF" POSITION.

WIRING SIDE
SHOWN
P-1

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15

WONDER CHORD
CONTROL HEAD CABLE #1WIRING SIDE
SHOWN
P-2

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15

WONDER CHORD
CONTROL HEAD CABLE #2WIRING SIDE
SHOWN

1	2	3
4	5	6
7	8	9
10	11	12

CONTROL TO VOICE BD.
CABLE C508-059736

PIN	WIRE	FUNCTION
1	BLACK (SHIELD)	RHYTHM VOLUME GND.
2	S.C.S.	RHYTHM VOLUME POT.
3	BROWN	WALTZ
4	RED	FOX TROT
5	ORANGE	+22V
6	YELLOW	ON/OFF
7	GREEN	DN/OFF
8	BLUE	SWING
9	PINK	LATIN
10	GRAY	ROCK
11		
12		

4	1
5	2
6	3

WIRING SIDE
SHOWN

KEYCAP TO TONE COLOR CABLE

PIN	WIRE	FUNCTION
1	WHITE #22	+53V
2	ORANGE	+22V
3	SCS #2	TO ACCOMP. FILTER
4	BLACK #22	GROUND
5	BLACK	SHLD. OF S.C.S. #1
6	S.C.S. #4	FROM ACCOMP. HDR.

PIN	WIRE	FUNCTION
1	BROWN	TEMPO LIGHT
2	VIOLET #22	+28V
3	ORANGE	SEE WONDER CHORD SCHEM. R501-053046
4	YELLOW	"
5	GREEN	"
6	BLUE	"
7	VIOLET	"
8	GRAY	"
9	WHITE	"
10	PINK	"
11		
12	BLACK	SEE WONDER CHORD SCHEM. R501-053046
13		
14	YELLOW #1	AUTO PEDAL TRIG
15	GREEN #1	AUTO ACCOMP. TRIG

PIN	WIRE	FUNCTION
1	BLACK	GROUND
2	BROWN	TEMPO CONTROL
3	RED	SEE WONDER CHORD SCHEM. R501-053046
4	ORANGE	"
5	YELLOW	"
6	GREEN	"
7	BLUE	"
8	VIOLET	"
9	GRAY	"
10	WHITE	"
11		
12	LT. GREEN	SEE WONDER CHORD SCHEM. R501-053046
13	SHLD. #2	AUTO CHORD
14		
15		

PART DISTRIBUTION					
R.Y.	R.E.	SOUL.	R.A.L.		
5	5	5	5	5	5
5	5	5	5	5	5
5	5	5	5	5	5
5	5	5	5	5	5
5	5	5	5	5	5
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5	5	5	5	5	5
5	5	5	5	5	5

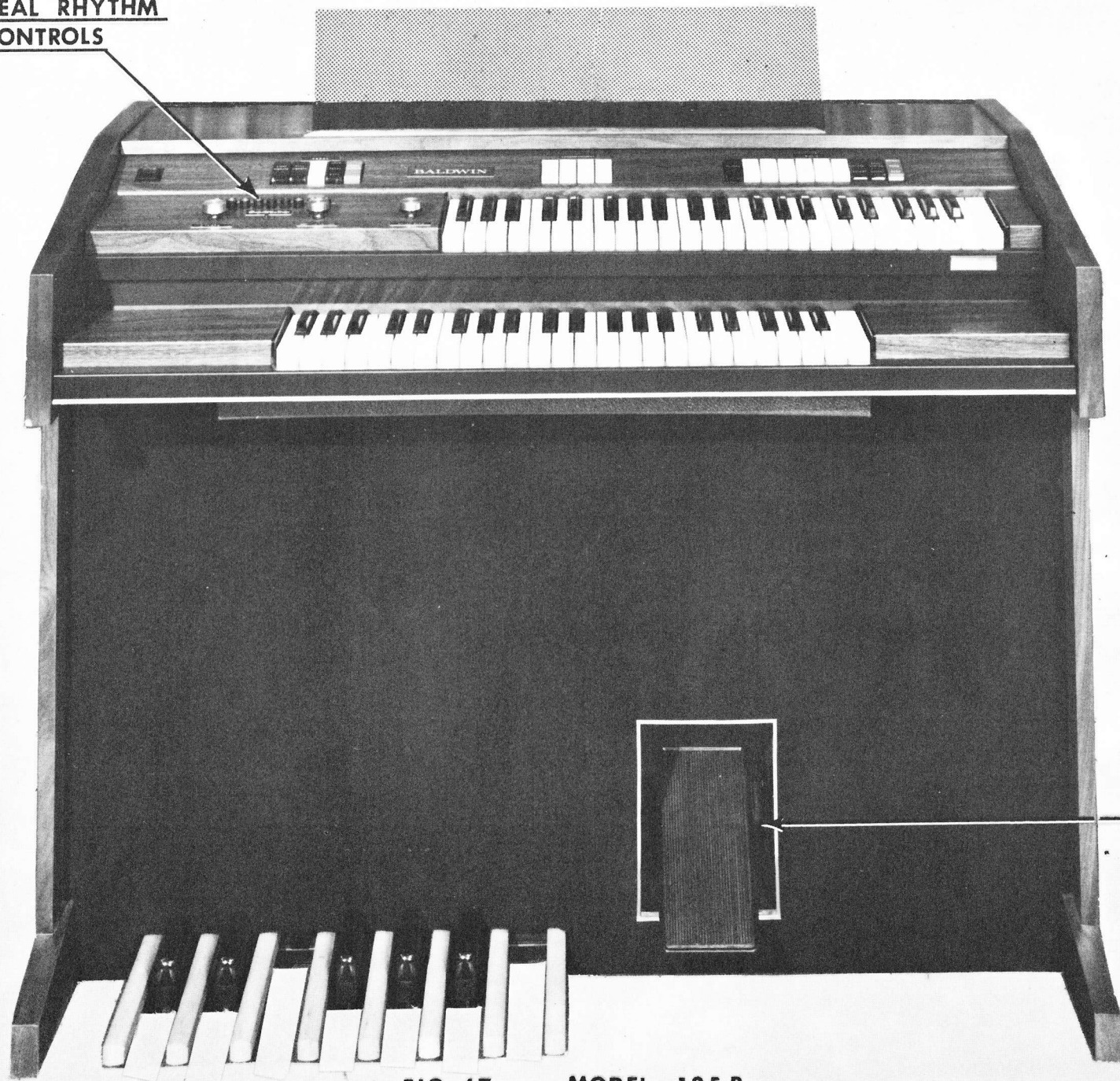
PART NAME		PART NO.	
WONDER CHORD CONTROL HEAD SCHEMATIC		8-20-73	
C.N. 15,686 1-10-74 W.R.M.		NOTE IT	
ORGAN N124B & C		NEXT ASSEMBLY	
D. H. BALDWIN CO. CINCINNATI, OHIO		501-059912	

MODEL N124R GENERAL INFORMATION

The Model N124R is electronically the same as the N124A with the following exceptions:

1. The Real Rhythm (TMD) replaces the Auto Rhythm circuitry.
2. The N124B Pedal keying system is used.
3. A six (6) inch speaker and a crossover are added.

REAL RHYTHM
CONTROLS



REAL RHYTHM
STOP-START
SWITCH

FIG. 47

MODEL 125 R

TWEETER SPEAKER
A513-054664

REAL
RHYTHM
UNIT
X500-
059455

RHYTHM
STOP-START
SWITCH

FIG. 48 MODEL 125R - REAR

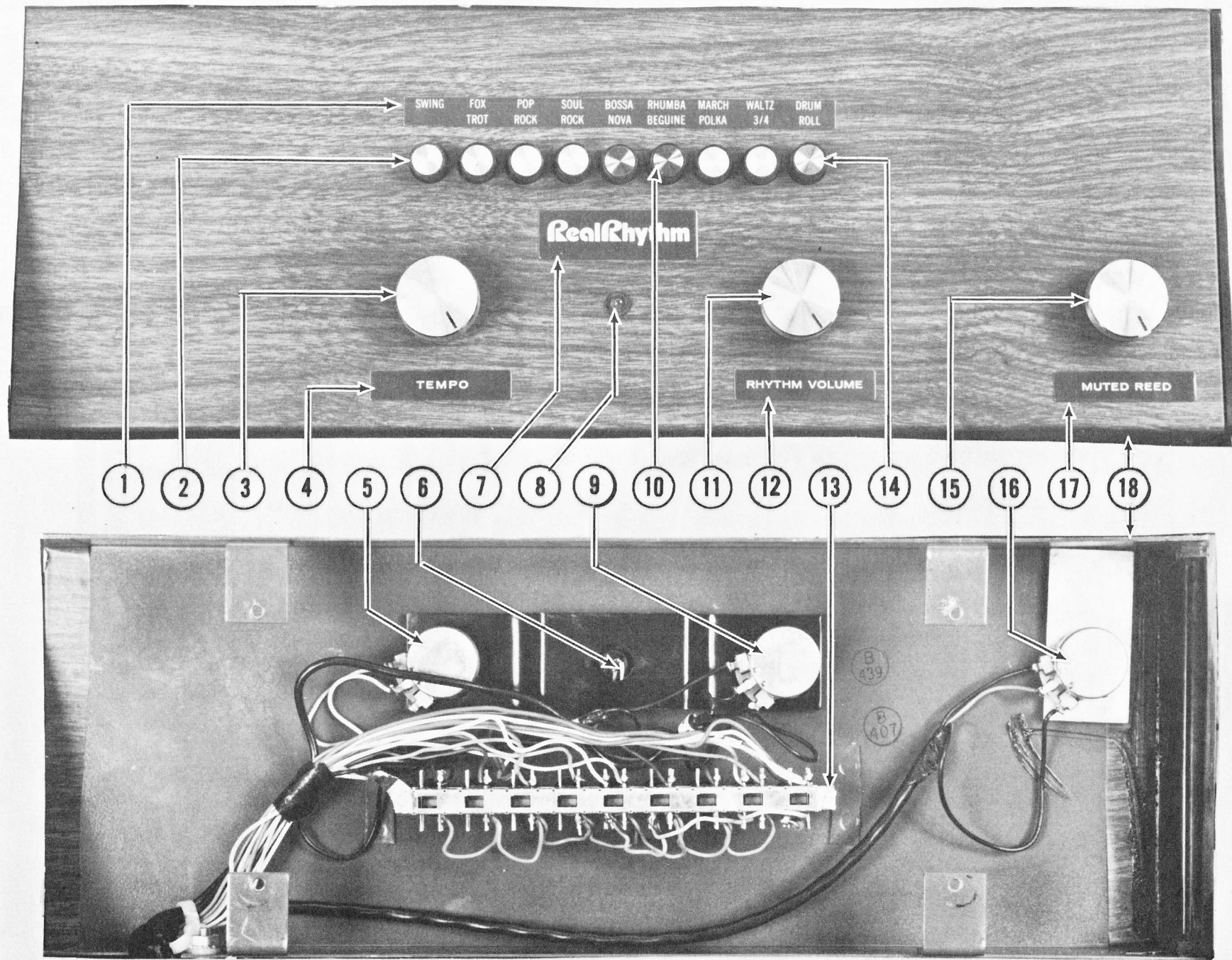


FIG. 49 REAL RHYTHM CONTROLS

FIG. 49 DESCRIPTION

ITEM	DESCRIPTION	PART NUMBER
1.	NAMEPLATE - REAL RHYTHM (TMD) FUNCTIONS	A249-060125
2.	PUSH BUTTON - A250-054568 CLEAR BUTTON INSERT	A247-054869
3.	TEMPO CONTROL KNOB	A247-052042
4.	NAMEPLATE - TEMPO	A249-052048
5.	TEMPO POTENTIOMETER	B509-040783
6.	TEMPO LED ASSEMBLY	A514-058969
7.	NAMEPLATE - REAL RHYTHM	A249-059754
8.	TEMPO LIGHT - (LED) LIGHT EMITTING DIODE	X514-059254
9.	RHYTHM VOLUME POTENTIOMETER	B509-040783
10.	RED INSERT	A247-054868
11.	RHYTHM VOLUME KNOB	A247-052042
12.	NAMEPLATE - RHYTHM VOLUME	A249-053631
13.	REAL RHYTHM PUSH BUTTON SWITCH ASSEMBLY - 9 STATION	B506-059129
14.	BLUE INSERT	A247-054867
15.	MUTED REED KNOB	A247-052042
16.	MUTED REED POTENTIOMETER (100K REVERSE AUDIO)	B509-039731
17.	NAMEPLATE - MUTED REED	A249-053882
18.	SOLO BASS KEYCAP - FINAL ASSEMBLY - 124R	X500-060148

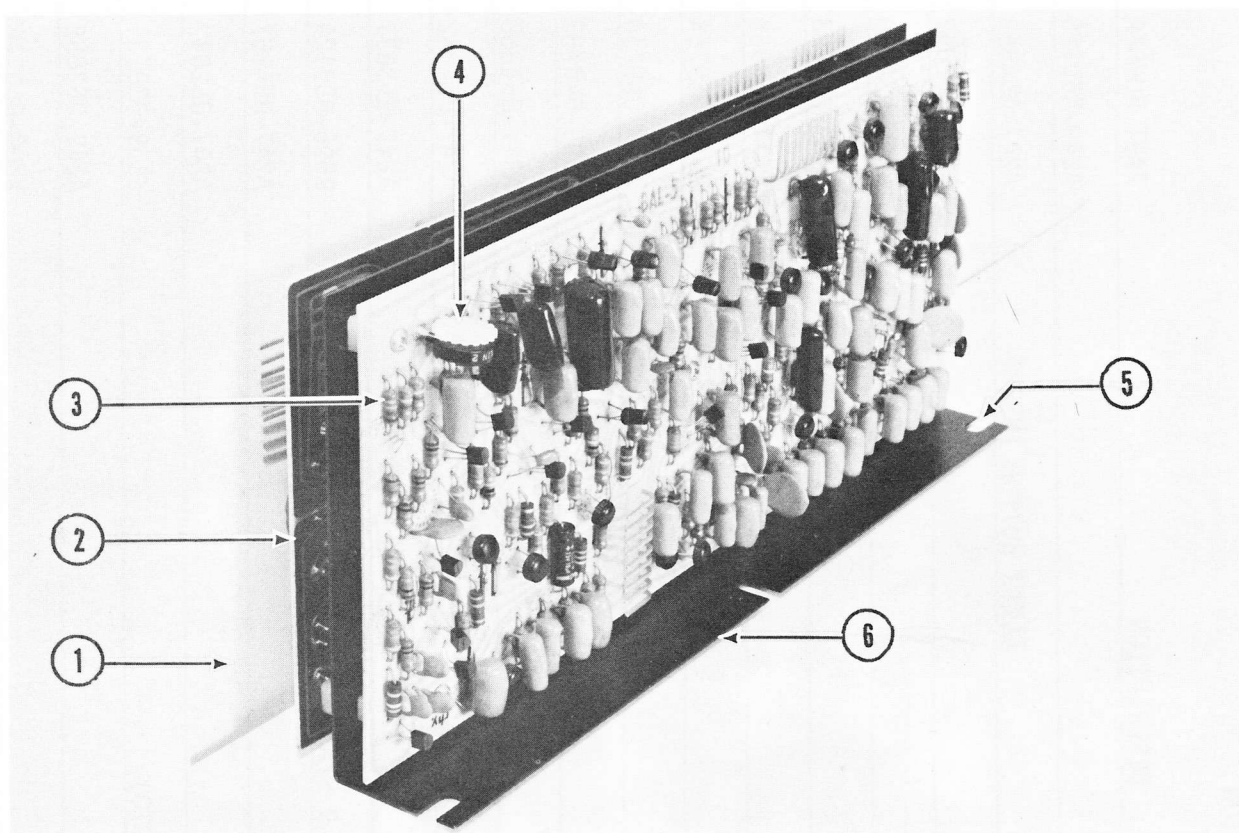
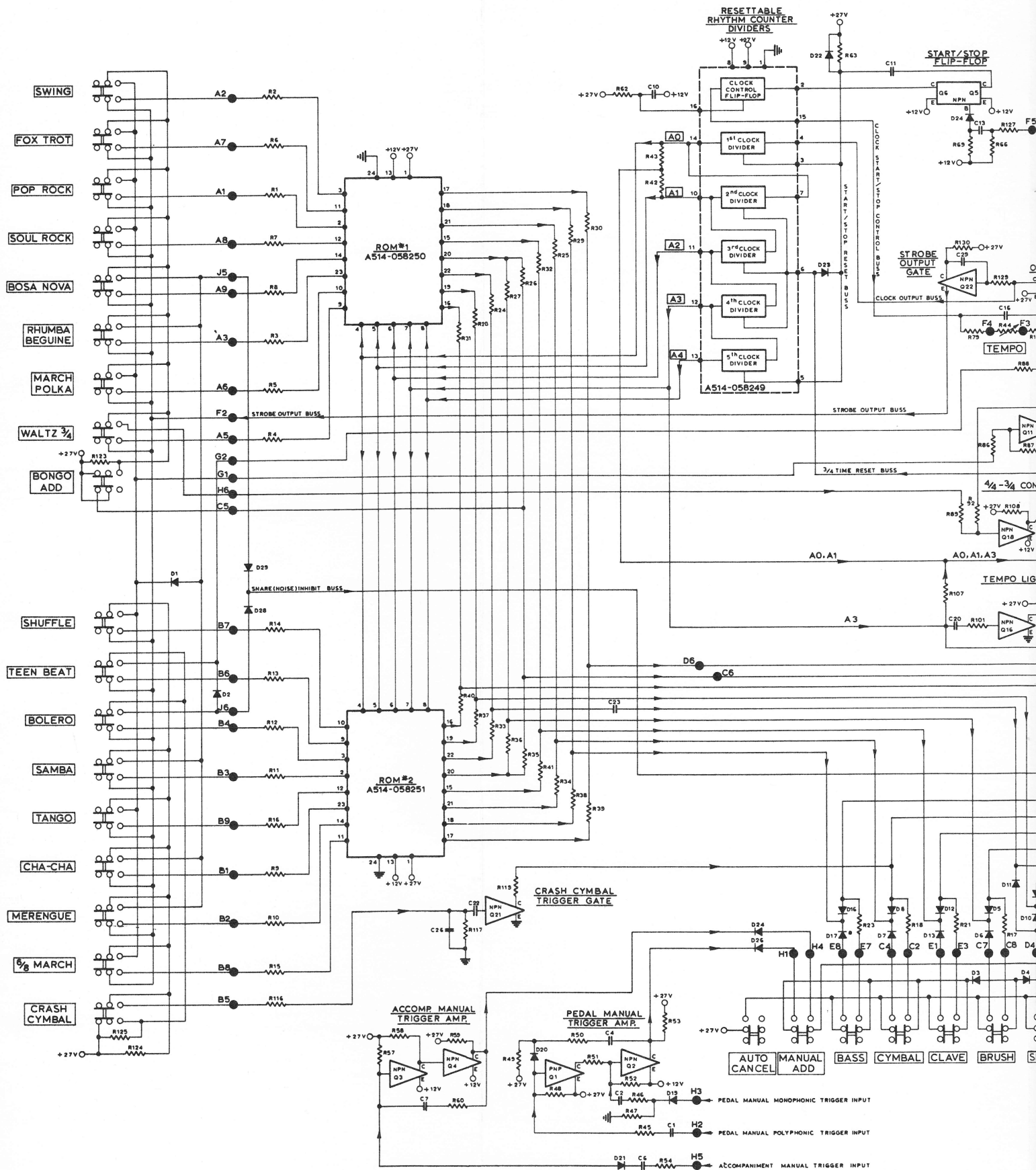
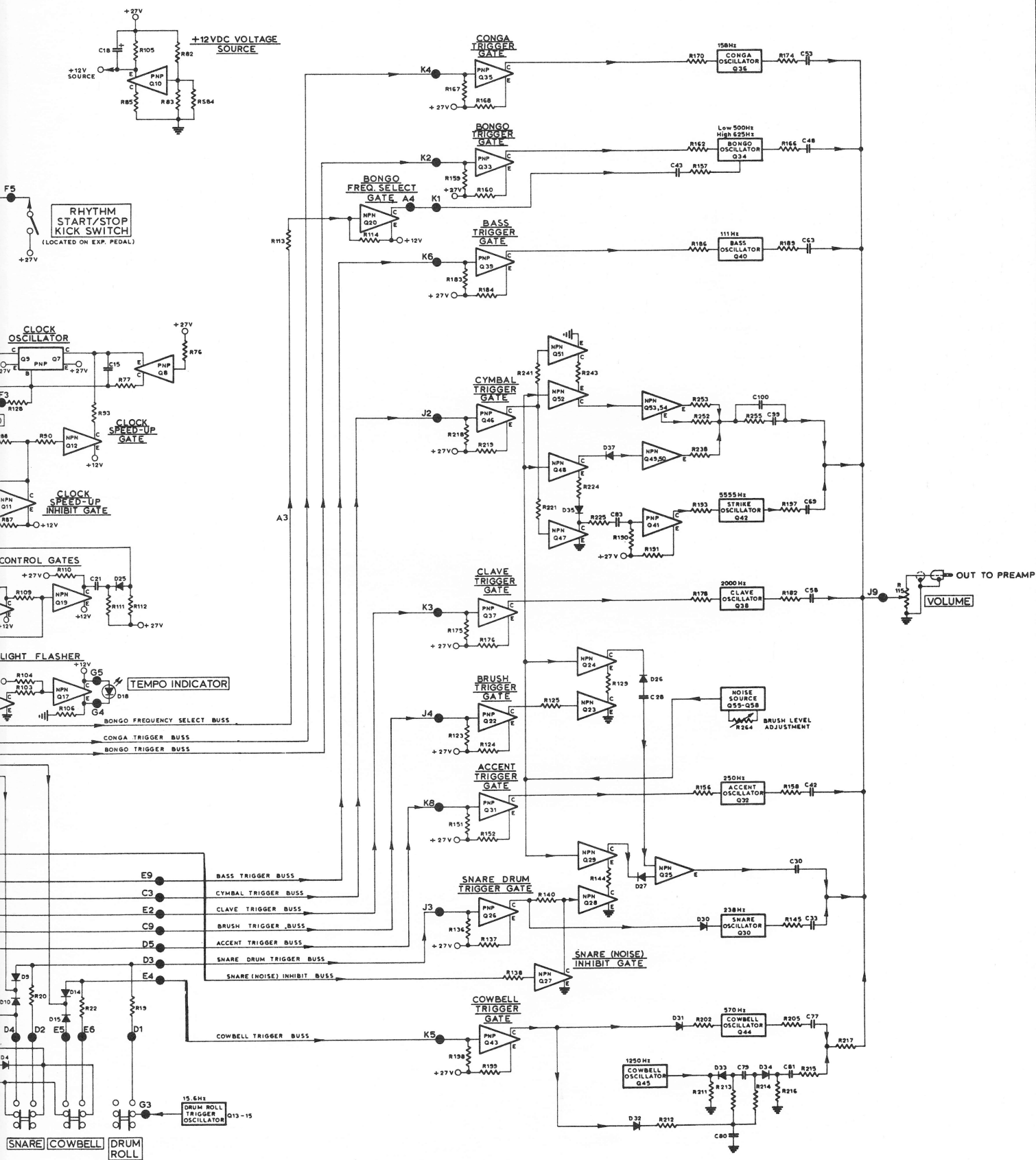


FIG. 50 - REAL RHYTHM BOARDS ASSEMBLY

(TMD)

ITEM	DESCRIPTION	PART NUMBER
1.	REAL RHYTHM T.M.D. UNIT ASSEMBLY	X500-060225
2.	REAL RHYTHM LOGIC BOARD ASSEMBLY	C500-060174
3.	REAL RHYTHM VOICE BOARD ASSEMBLY	C500-059386
4.	REAL RHYTHM BRUSH ADJUSTING MINIPOT - 100k	B509-041912
5.	SLOTS FOR MOUNTING SCREWS (3)	
6.	MOUNTING PLATE	C528-059366





REAL RHYTHM BLOCK DIAGRAM

FIGURE 51

DWN: Q.V.L.A.
DATE: 9-27-73

REAL RHYTHM THEORY

The Baldwin Real Rhythm is a solid state device which is capable of producing automatic rhythm patterns and is capable of being played manually. Referring to the chart of Real Rhythm features used on organ models, there are basically three (3) versions of the unit:

1. 16 AUTOMATIC RHYTHM PATTERNS WITH MANUAL RHYTHM TRIGGERING.
2. 8 AUTOMATIC RHYTHM PATTERNS WITH MANUAL RHYTHM TRIGGERING.
3. 8 AUTOMATIC RHYTHM PATTERNS WITHOUT MANUAL RHYTHM TRIGGERING.

The Automatic Rhythm patterns on the eight pattern unit include:

Swing
Fox Trot
Pop Rock
Soul Rock
Rhumba Beguine
Bosa Nova
March Polka
Waltz 3/4

The sixteen rhythm pattern units in addition to the above eight rhythm patterns include the following additional patterns:

Shuffle
Teen Beat
Bolero
Samba
Tango
Cha-Cha
Merengue
March 6/8

The following rhythm percussion voices can be triggered manually:

From Accompaniment Manual:

Cowbell
Snare
Brush

From Pedals:

Bass
Cymbal
Clave
Brush

The DRUM ROLL or CRASH CYMBAL rhythm voices are sounded only while depressing a corresponding "instant touch" push button. The organs with the manual rhythm feature include MANUAL ADD and AUTO CANCEL push buttons. Depressing the AUTO CANCEL push button, rhythm voices can be selectively cancelled (by depressing its voice push button) from the Automatic Rhythm pattern. The MANUAL ADD push button, when depressed, allows selected manual rhythm voices to be sounded from pedal or accompaniment manual.

By depressing the AUTO CANCEL and MANUAL ADD buttons at the same time, voices that are cancelled from the Automatic Rhythm pattern can be played manually.

The BONGO ADD push button, when depressed, will add a Bongo rhythm voice to the Automatic Rhythm pattern at the same time the Brush rhythm voice is normally sounded.

REAL RHYTHM FEATURES USED ON ORGAN MODELS

	124	125	126	130	131	213	214	230	
16 Rhythm Pattern									
8 Rhythm Pattern	X	X		X	X	X	X	X	
Bongo Add				X	X	X	X	X	
Drum Roll	X	X		X	X	X	X	X	
Crash Cymbal									
Manual Add				X	X	X	X	X	
Auto Cancel				X	X	X	X	X	
Pedal Manual Trigger				X	X	X	X	X	
Accomp. Manual Trigger				X	X	X	X	X	

The circuitry for the Real Rhythm system is contained on two (2) printed circuit boards and a control panel.

The VOICE BOARD assembly is the same for eight or sixteen rhythm pattern units and contains ten (10) voice generators and a noise source circuit. The following voices are used in this system:

Brush, Snare Drum, Accent, Bongo, Conga, Clave, Bass, Strike, Cowbell and Cymbal.

The noise source output level is adjustable by a single minipot and is applied to the Cymbal, Brush and the Snare Drum circuits.

The LOGIC BOARD assembly utilizes the same printed board for all organ models with component deletion of circuits that are not used on a particular model. A Real Rhythm Logic Board assembly contains the following circuits:

TWO "READ ONLY MEMORY" (ROM)

Read Only Memory is the memory storage integrated circuit device of the MOS type (MOS/LSI) which will hereafter be referred to as the ROM. Each ROM acts as a diode matrix for one group of eight (8) rhythm patterns, which, when a particular rhythm pattern is selected, directs the trigger pulses to appropriate rhythm voice circuits.

On organs with an eight (8) rhythm pattern unit, only one ROM is necessary, thus ROM #2 and associated components are omitted from the logic board assembly.

CLOCK CIRCUIT

The Clock circuit consists of a free running multivibrator in which the frequency (rate) is determined by the Tempo Speed control located on the tone color. The Clock output is applied to five cascaded divide-by-two stages in the counter circuit to provide the address for the ROM. The Clock output is also applied in the form of "Strobe" pulses via the Strobe Output Gate and Rhythm Pattern Selector switches to the ROM. When the ROM is selectively gated by the counter address, the strobe pulses are inverted and applied as a trigger for the rhythm voices.

RESETTABLE RHYTHM COUNTER DIVIDERS

The counter circuit, an integrated circuit device, consists of six (6) divide-by-two flip-flop divider stages.

The first divider, Divider #1, in conjunction with the Start-Stop Flip-Flop and rhythm Start-Stop kick switch is used to able (start) or disable (stop) the clock oscillator. Dividers #2 through #6 divide the clock oscillator output into five separate outputs referred to as five bit binary address information for the ROM. Comparing the five divider waveform outputs in a time period of one full cycle of the last (#6) divider output, it is possible to establish thirty-two (32) different combinations of five momentary values of output voltages (+27 or +12V). Each one of the thirty-two (32) combinations represent 32 separate address bits, which are supplied to the ROM and, depending upon the information stored in the memory of the ROM, allows the strobe pulse, applied from the rhythm pattern switch, to be inverted and applied to any of eight ROM outputs.

CLOCK SPEED-UP & CLOCK SPEED-UP INHIBIT GATES

The Speed-Up and Inhibit Speed-Up gates are used on the sixteen (16) pattern units only. On the eight (8) pattern units, components for this circuit are deleted from the logic board assembly.

When the Teen-Beat or Bolero rhythm patterns are selected, the clock speed-up gate is activated by the positive voltage supplied by rhythm pattern switches, causing clock frequency to increase. If any other rhythm pattern switch except Waltz is depressed together with Teen-Beat or Bolero, the clock speed-up inhibit gate is activated by the voltage from the rhythm pattern switches. This inhibits the operation of the clock speed-up gate and permits oscillator to return to its normal operating frequency (speed).

4/4 OR 3/4 CLOCK CONTROL GATES

In the Waltz 3/4, Teen-Beat, and Bolero modes of operation, the counting sequence of five dividers is altered from normal 4/4 time pattern to 3/4 time patterns. Teen-Beat or Bolero 3/4 time patterns will be forced back to 4/4 time patterns by any other pattern switch except Waltz 3/4. The Waltz 3/4 always forces the unit to a 3/4 time pattern.

TEMPO LIGHT CIRCUIT

The Tempo Light circuit, consisting of a Light Emitting Diode (LED) type of indicator and associated circuitry, is operated by the counter's 4th divider output binary address bit A3, indicating the downbeat of every measure.

DRUM ROLL OSCILLATOR CIRCUIT

A continuously operating trigger type of oscillator produces negative pulses of 8 ms width at 156 Hz rate, allowing continuous triggering of the Snare Drum oscillator, as long as the Drum Roll spring loaded push button is depressed.

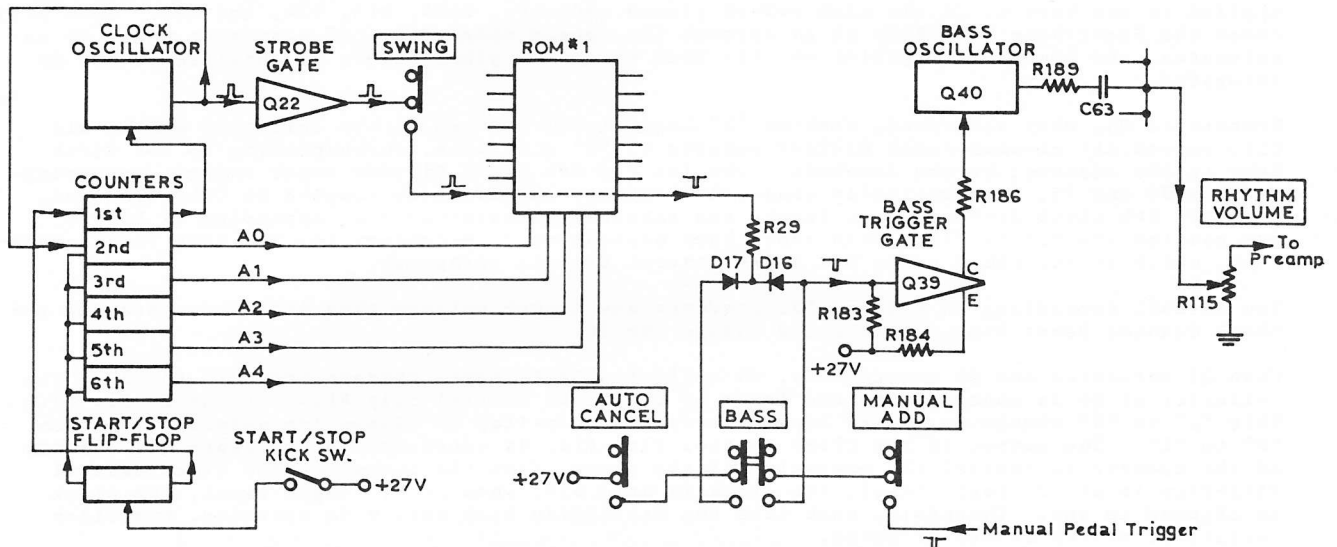
CRASH CYMBAL TRIGGER CIRCUIT

The Crash Cymbal spring loaded type of push button, used only on 16 rhythm pattern units, when depressed, triggers the Cymbal oscillator circuit via Crash Cymbal gate.

On organs with eight (8) pattern units without the manual rhythm feature, the Bongo frequency selector gate and its associated components are omitted from the logic board assembly.

ACCOMPANIMENT AND PEDAL MANUAL RHYTHM TRIGGER CIRCUITS

SIMPLIFIED FUNCTIONAL BLOCK DIAGRAM



REVIEW OF CIRCUIT OPERATION

Depressing the START/STOP KICK SWITCH allows the START/STOP FLIP-FLOP to toggle, resetting Counters #2 through #6, enabling the CLOCK OSCILLATOR to begin operating. The Clock Oscillator output applied to the counter chain is divided five times to establish A0, A1, A2, A3, and A4 outputs which make up the ROM address. Clock Oscillator output pulses are slightly delayed and, in the form of STROBE PULSES, are applied to the ROM input via the rhythm pattern switches (SWING). When the ROM is appropriately addressed by the counter, the strobe pulses will be gated through the ROM to appear at one of its eight (8) outputs as a negative (inverted) trigger pulse. The delay of the Strobe Pulses behind the clock output for the counter address system permits the ROM to preset a specific conductive path prior to the time that the Strobe Pulses are received by the ROM.

All Real Rhythm voice oscillator circuit outputs are applied via level set resistors to the wiper of RHYTHM VOLUME potentiometer, then, via RHYTHM CLAMPING CIRCUIT, to the input of the Stationary preamplifier.

The ROM trigger pulse outputs to voice trigger gates can be inhibited, except for CONGA and BONGO voices, by depressing such voice push buttons together with AUTO CANCEL button.

In our example, the ROM trigger pulse output for the bass trigger gate, via R29, will be inhibited by D17 when forward bias for D17 is supplied by +27V source via AUTO CANCEL and BASS push button contacts. This action will not affect manual triggering, as diode D16 is non-conducting and manual trigger pulses are unaffected.

DETAILED CIRCUIT OPERATION THEORY

Logic voltage levels used for the Real Rhythm circuits are +27 volts and +12 volts. In the following writeup, reference for these voltage values is given in logic terminology as:

+27V is "0"

+12V is "1"

+12 VDC SUPPLY

The +12 volt source is derived from the organ +27 volt regulated supply via resistor divider R82, R83, RS84, and the base emitter circuit of Q10 transistor.

START/STOP CIRCUIT

The Start/Stop Flip-Flop, consisting of Q5 and Q6 and associated circuitry, operates as a monostable flip-flop. Each time the Start/Stop Kick Switch is operated, a positive pulse is applied to the base of Q5 via kick switch closed contacts, R127, C13, D24, and R68. This will cause the Start/Stop Flip-Flop to go through its toggle operation. Q5 saturates while Q6 unsaturates, and then the flip-flop reverts back to its original state, Q5 unsaturated and Q6 saturated.

Transistor Q5, when saturated, creates "1" logic level voltage at its collector which, via C11, resets all counter clock divider outputs to "0" condition, corresponding to the first beat in the measure, or the downbeat. The 1st and 5th Clock Divider reset inputs, appearing on Pins #3 and #5, are externally connected together and directly coupled to C11. The 2nd, 3rd, and 4th Clock Divider reset inputs are internally connected and, appearing on Pin #6, are coupled via D23 to C11. This reset buss separation is necessary for 3/4 time reset operation, which is described under 4/4 & 3/4 Control Circuit paragraph.

The circuit consisting of R63 and D22 prevents any higher voltage than +27V from entering the Clock Counter Reset Buss, which could damage the IC.

When Q5 saturates and Q6 unsaturates, Q6 collector logic level changes from "1" to "0". The collector of Q6 is connected to the input of the Clock Control Flip-Flop. (Counter Pin #2.) This "1" to "0" change in binary input causes the flip-flop to change its output state from "0" to "1". The output of the Clock Control Flip-Flop is connected to the clock via Pin #15 of the counter to control the operation of the clock. When the output of the Clock Control Flip-Flop is at "0" logic level, the clock is held off; when at "1" logic level, the clock is allowed to run. Therefore, each time the Start/Stop kick switch is operated, the Clock Oscillator either starts or stops.

To prevent the rhythm unit from running when the power switch of the organ is switched from "OFF" to "ON", a reset "1" logic level, created at the junction of R62 and C10, resets the Clock Control Flip-Flop to "0" output level, thus holding the Clock Oscillator in the "OFF" state.

CLOCK CIRCUIT

The Clock Oscillator, consisting of Q7, Q8, and Q9, operates as a free running multivibrator, and is controlled by the output state of the Clock Control Flip-Flop in the counter IC. The output of this flip-flop is coupled to the clock circuit via Pin #15 of the counter, R79, the Tempo potentiometer R44, and R128 to the base of Q9. The emitter of Q9 is referenced to "0" logic level, so with the Clock Control Flip-Flop output at "0", Q9 will be held off, thus disabling the oscillator.

When the flip-flop output changes its state from "0" to "1" as the Start/Stop Kick Switch is depressed, the resulting negative pulse is coupled to the base of Q9 via C16, and Q9 saturates. As Q9 saturates, its positive going collector voltage is coupled to the base of Q7 via C25, causing Q7 to go out of saturation. This condition will exist for a time period determined by the time constant of C25 and R73. When the charging current of C25 decreases to a point where the voltage across R73 is no longer sufficient to keep Q7 cut off, Q7 will go into conduction again. As Q7 starts conducting, the positive going voltage developed at its collector is coupled via C15 to the base of Q9, thereby unsaturating Q9. Q9 will remain unsaturated for a period of time determined by the time constant of C15, R128, the Tempo potentiometer, and R78. When the charging current of C15 decreases to a point at which the base of Q9 is no longer back biased, Q9 will again saturate and the cycle will repeat itself.

The clock output positive pulses are developed at the collector of Q9 when it conducts. These pulses have a fixed width of 10 ms. The time duration between the clock pulses, determined by the off time of Q9, is adjustable by the Tempo potentiometer.

Transistor Q8 also unsaturates as Q7 conducts. Q8 provides additional base current for Q9, assuring its full saturation, especially at low frequency settings.

As long as the output state of the Clock Control Flip-Flop is in a "1" state, the clock will run as a free multivibrator.

Real Rhythm Theory (Cont'd.)

The clock pulses from the collector of Q9, are applied to the input of the clock dividers, via Pin #4 of the counter IC. In addition, the clock pulses are applied to Q22, an emitter follower, which acts as a buffer amplifier and a delay stage. Delay for these pulses, now referred to as "Strobe" pulses, is accomplished by R130 and C29, which puts them slightly behind the clock pulses that are fed into the counter. This slight delay allows the counter to set its next binary address, prior to the time of application of the Strobe pulses. The Strobe pulses are fed to the rhythm switch pattern common buss and are directed to the ROM input by the particular rhythm pattern switch or switches that are depressed.

CLOCK SPEED-UP & INHIBIT SPEED-UP CIRCUIT

In the Teen Beat or Bolero modes of rhythm pattern operation, the Clock Oscillator frequency and rhythm tempo are increased. This feature is used on the 16 rhythm pattern units only.

Transistor Q12, when saturated by the positive voltage from the above rhythm pattern switch contacts via R88 and R90, parallels R75 in the oscillator circuit with R93, thus increasing its operating frequency. The same positive voltage from the above pattern switches is also applied to the base of Q18 transistor via R88 and R92 resistors. Q18 will saturate, placing the unit in the 3/4 mode of operation. For further information on 3/4 tempo operation, refer to the 4/4 & 3/4 Control Circuit Theory paragraph.

All rhythm pattern switches, except Waltz, Teen Beat, and Bolero, when depressed, apply positive voltage via R86 to the base of Q11 Speed-Up Inhibit Gate. Q11 will saturate, defeating the speed-up voltage for Q12 at the junction of R88 and R90. Q12 will unsaturate, allowing the clock oscillator to operate at its standard lower frequency. Therefore, if any other rhythm pattern (except Waltz) is depressed together with the Teen Beat or the Bolero rhythm patterns, the unit will be in 4/4 time and the clock will be prevented from speeding up.

RESETTABLE RHYTHM COUNTER DIVIDER CIRCUIT

As described previously, the resettable Rhythm Counter Divider IC contains six (6) divide-by-two stages. For clarification, each divider is named as per the accompanying Real Rhythm Block Diagram. The first divider, called the Clock Control Flip-Flop, is used to start and stop the clock oscillator in response to an input from the Start/Stop Flip-Flop. Its circuit operation has been described under the Start/Stop Circuit paragraph. The remaining five dividers, the 1st Clock Divider through the 5th Clock Divider, are used as binary counters which divide the clock oscillator output into a five bit address to the ROM. The bits are designated as A0, A1, A2, A3, and A4.

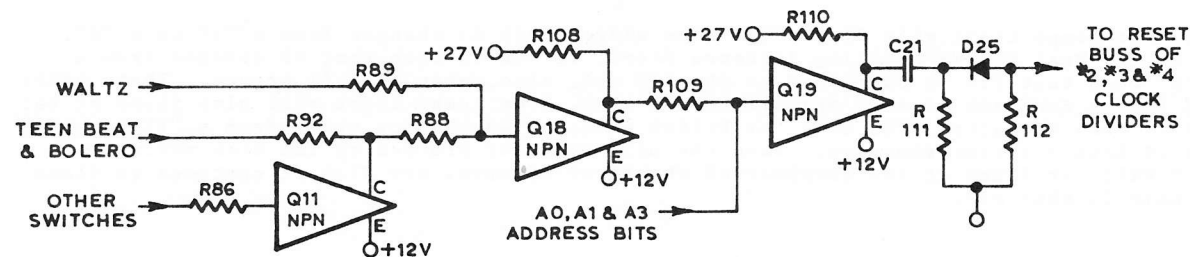
Only a "1" to "0" transition at the input of the dividers causes the divider to change its output state. Also, only the "0" to "1" transition applied to the counter reset input sets the output of the counter to "0". At the same time, the reset input, will override any additional input to the counters.

To analyze the action of the clock dividers, we will assume that the Start/Stop Kick Switch has just been depressed and the clock is running. The first clock pulse, applied to the counters at the same time with the reset pulse from the Start/Stop Flip-Flop, will not have any effect. The outputs of all counters will remain at "0" level. This is the first beat of the measure or the downbeat.

The next clock pulse (transition "1" to "0") applied to the 1st clock divider input will cause it to change its output state from "0" to "1". This corresponds to the second beat of a measure with the count address to the ROM now set to "0", "0", "0", "0", "1". The further progression of these changes is shown on the Real Rhythm Counting Sequence Chart and on the Real Rhythm Logic Waveform Chart Drawing Number D579-400. Note that the counters provide 32 different binary addresses before the cycle repeats. Each clock pulse corresponds to 1/16 note, therefore, two measures of rhythm can be produced during one binary cycle of the counter. This means that a full two measures of rhythm are produced by the Real Rhythm unit before the rhythm pattern repeats itself.

4/4 & 3/4 TEMPO CONTROL CIRCUIT

Alteration of the counter divider counting sequence, from 4/4 time to 3/4 time for Waltz, Teen Beat, and Bolero rhythm patterns is accomplished by Q18, Q19, and associated circuit shown below:



Real Rhythm Theory (Cont'd.)

In any other rhythm pattern mode of operation, except Waltz, Teen Beat, or Bolero, Q18 base does not receive any positive voltage; therefore, Q18 remains unsaturated. Its collector positive voltage applied via R109 to the base of Q19 causes Q19 to be saturated. Depressing the Waltz pattern switch applies a positive voltage to the base of Q18 via R89, causing Q18 to saturate. The same condition will exist when Teen Beat or Bolero rhythm pattern switches are depressed, with the following exception. If any other rhythm switch, except Waltz, is depressed along with Teen Beat or Bolero, Clock Speed-Up Inhibit gate Q11 will saturate, removing the base bias voltage for Q18 at the junction of R92 and R88, thus disabling the circuit for 3/4 mode of operation.

In the 3/4 mode of operation, when Q18 is saturated, Q19 loses its base supply, saturates, and is under the influence of the voltage applied to its base by binary bits A0, A1, and A3 from the counter. When any of the above binary bits are at "0" level, Q19 will saturate; when all three binary bits are at "1" level, Q19 will unsaturate.

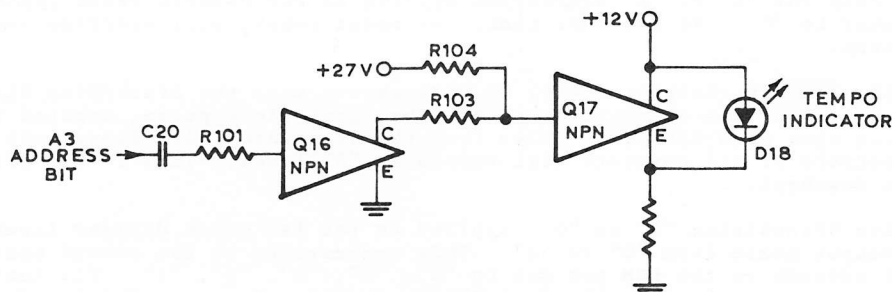
Referring to the Real Rhythm Counting Sequence Chart, it can be seen that between beats #1 and #11, at least one of the address bits (A0, A1 or A3) is at "0" level, therefore Q19 remains saturated. The first time the above address bits are all at "1" level is on beat #12, at which time Q19 goes out of saturation. This causes the collector of Q19 to change its level from "1" to "0". Diode D25 will prevent this positive voltage transition from being transferred to the counters. However, on beat #13, A0 and A1 both become "0" and Q19 again saturates. The resulting negative excursion at the collector of Q19 is coupled via C21 and D25 to the 3/4 Reset Line for counters #2, #3, and #4, causing counters #3 and #4 (A2 and A3) to reset their outputs to "0". Counter #2 (A1) is already at "0" level. Because of the internal connection, when counter #4 (A3) is reset from "1" to "0", counter #5 (A4) output will also change its state from "0" to "1".

Now a new binary address, 1-0-0-0-0, corresponds to beat #17. As a result of this instantaneous circuit action, beat #17 occurs immediately after beat #12. Beats #13, #14, #15, and #16 are therefore skipped. A similar situation occurs on beat #28, causing beats #29, #30, #31, and #32 to be omitted.

The overall effect in omitting the four 1/16 beats on each measure is that the measure is now reduced to twelve 1/16 beats or 3/4 time.

TEMPO LIGHT CIRCUIT

The Tempo Light Circuit illustrated below consists of Q16, Q17, a solid state indicator (light emitting diode - LED), and associated circuitry.



Normally, in the absence of an input signal to Q16, the lamp driver transistor Q17 is saturated by the positive voltage applied to its base via R104 from the +27 volt supply. Under these conditions, the current from the +12 volt supply flows through the saturated transistor and R106, therefore the forward bias for the LED (D18) is removed, causing it not to emit light.

The base of normally non-conducting transistor Q16 is connected via C20 and R101 to the output of the 4th clock divider, A3 binary bit. Each time A3 changes from "1" to "0" binary state, the positive excursion will pulse Q16 on for a short period of time. As Q16 is pulsed on, Q17 is pulsed off. When Q17 is not saturated, the current from the +12 volt supply will flow through the light emitting diode, D18, causing it to emit light. Q17 and D18 form a constant load on the +12 volt supply, thus cancelling otherwise undesirable voltage changes (transients) introduced by the load switching.

In summary, the Tempo Light will flash each time address bit A3 changes from a "1" to a "0". Referring to the Real Rhythm Counting Sequence Chart, it can be seen that A3 changes from a "1" to a "0" when beat #17 is addressed to the ROM and, also, when beat #1 occurs. These beats correspond to the downbeat of each measure in 4/4 time. The Tempo Light will also flash at the correct time, when in Waltz, Teen Beat, or Bolero modes as A3 changes state from a "1" to a "0" at the end of both 3/4 time measures. When the unit is first started by the kick switch, the Tempo Light will not flash at the downbeat of the first measure, nor will it continue to flash after the unit is shut off.

READ ONLY MEMORY (ROM) CIRCUIT

The Read Only Memory (ROM) acts as a diode matrix. Each ROM is programmed for eight different rhythm patterns.

The Strobe Output Gate Q22 supplies the Strobe pulses via selected rhythm pattern switches and isolation resistors R1 through R8 to ROM #1, and R9 through R16 to ROM #2, input Pins 2, 3, 9, 10, 11, 12, 14, and 23.

The five bit binary address A0, A1, A2, A3, and A4 provided by the clock dividers is applied to ROM Pins 4, 5, 6, 7, and 8. This binary address directs the Strobe pulse, which is inverted by the ROM, to one or more of the eight ROM outputs on Pins 15 through 22. The same ROM #1 and ROM #2 output busses are resistively summed together and applied via a diode gate to the rhythm voice trigger gates.

One of the ROM's output busses (Pin #20) is resistively summed to trigger the Brush voice via R27 or R36 and, at the same time, the Bongo voice via R26 or R35. The triggers for the above voices can be separately inhibited. Trigger for the Bongo is normally inhibited until the Bongo Add push button is depressed. The trigger for the Brush is inhibited when both the Auto Cancel and the Brush push buttons are depressed.

The progression of the ROM output trigger pulses to the rhythm voices on each beat of the 1st and 2nd measures for all rhythm patterns is indicated on the Real Rhythm Master Pattern Drawing Number D579-399.

AUTO CANCEL CIRCUIT

When the Auto Cancel switch is depressed, the +27 volts is applied to the wipers of all pedal and accompaniment rhythm voice push buttons. If any of these push buttons are depressed, this positive voltage will forward bias an inhibit diode (i.e., for Bass, D17). This inhibits the trigger pulse from the ROM and prevents the automatic triggering of the Bass voice.

MANUAL ADD AND MANUAL TRIGGER AMPLIFIER CIRCUITS

The Manual Add push button, when depressed, applies the Pedal or the Accompaniment manual rhythm trigger pulses via selected rhythm switches to the rhythm trigger gates.

The Accompaniment Manual Trigger Amplifier consists of Q3 and Q4 transistors and associated circuitry. The negative trigger pulse generated on the organ Accompaniment manual when a key is depressed is applied via R54, C6, and D21 to the base of Q3, which causes Q3 to unsaturate and Q4 to saturate for the time period determined by C7 and R60. The negative going pulse created in Q4 collector circuit is applied via D24 and Manual Add switch through the selected Accompaniment rhythm voice switches to the appropriate rhythm voice trigger gates.

The Pedal Manual Trigger Amplifier circuit (Q1 and Q2) is similar to the Accompaniment Manual Trigger Amplifier, except that there are two input circuits, one for monophonic pedal latch system (via D19, R46, and C2 to the base of Q2) and the other for the polyphonic system (via C1 and R45 to the base of Q1). With either one of the pedal inputs, the collector of Q2 will produce a negative pulse and, when applied via D26, Manual Add switch, and through selected pedal rhythm voice switches, will sound the appropriate rhythm voices.

TOY COUNTER RHYTHM VOICE CIRCUITS

The Drum Roll Trigger Oscillator (Q13 and Q14) is a continuously operating type of oscillator, producing a negative pulse of 8 ms width at 156 Hz rate. Transistor Q15 is an output buffer stage that, as long as the Drum Roll spring loaded push button is held depressed, triggers the Snare Drum oscillator continuously.

The Crash Cymbal Trigger gate Q21 is triggered percussively when Crash Cymbal, also a spring loaded push button, is depressed. The Q21 collector will provide a necessary negative pulse to gate the Cymbal.

BONGO FREQUENCY SELECT CIRCUIT

The fourth Clock Divider output address bit A3 is applied to the base of the Bongo Frequency Select Gate Q20 via R113 resistor. When the address bit A3 output is at "0" level, Q20 will saturate; and when at "1" level, Q20 will unsaturate. When Q20 is unsaturated it has no effect on the Bongo oscillator frequency. At the time when Q20 is saturated, the Bongo oscillator frequency determining components will be effectively shunted by R157 in series with C43, causing the Bongo oscillator frequency to increase.

RHYTHM VOICE CIRCUITS

The Real Rhythm voice board assembly contains a noise source used for the Brush, Cymbal, and Snare Drum voices, as well as a series of gated-on oscillators used for the Conga, Bongo, Bass, Clave, Accent, Strike, Cowbell, and Snare Drum voices.

Real Rhythm Theory (Cont'd.)

The Conga, Bass, Clave, and Accent oscillators and their gates operate identically, therefore, only one of these voices, the Bass, will be discussed.

Bass trigger gate transistor Q39 is normally off, leaving collector resistor R186 with no DC path so Bass oscillator Q40 is inoperative. When a negative pulse is applied to the base of Q39, via Bass Trigger Buss, Q39 saturates for a period of time determined by the input pulse. This effectively provides a DC path for R186, enabling Q40 to function as an oscillator.

When Q39 is no longer held in saturation, C62 gradually charges through Q40 until the charge is sufficient to cut off Q40. In this manner, the cut off of the oscillator is controlled, with the decay envelope determined by C62 and R186.

The Bass Oscillator output is applied via level set resistor R189 in series with DC blocking capacitor C63 to a buss common to all other rhythm voice oscillator outputs, and then to the wiper of Rhythm volume potentiometer R115, located on the control panel.

The Bongo voice circuit operates identically to the Bass voice circuit, with the exception that the Bongo oscillator frequency is additionally controlled by the Bongo Frequency Select Gate Q20 as described under Bongo Frequency Select Circuit paragraph.

The Cowbell voice consists of a gated oscillator Q44 and continuously running oscillator Q45. The output of Q45 is controlled by a linear gate composed of D33 and D34. When the Cowbell is triggered, Cowbell Trigger Gate Q43 turns on for the duration of the trigger pulse, gating Q44 via D31 and R202. Trigger Gate Q43, when gated, also supplies positive voltage to the anodes of D33 and D34 via D32, R212, R213, and R214, allowing them to conduct the oscillator signal from Q45. Both oscillators employ separate level set components and are applied via R217 to the common rhythm output buss.

The noise circuit, consisting of noise source stage Q55 and the high pass amplifier Q56 through Q58, is the signal source for the Cymbal, Brush, and Snare Drum rhythm voices.

The Cymbal sound is achieved by simultaneously gating on two noise gates and the Strike oscillator gate. Cymbal Trigger Gate Q46, when triggered, saturates Q47 and Q51 by applying positive voltage through R221 and R241 to their bases. Q47 and Q51 supply ground paths for noise amplifier stages Q48 and Q52 respectively, allowing them to operate. Q48 applies its noise output to the high frequency amplifier circuit of Q49-Q50, while Q52 applies its noise output to the lower frequency amplifier Q53-Q54. Outputs from both amplifiers are resistively summed to a common point and then, via level set components, applied to the common rhythm output buss.

When triggered, Q47 also supplies a negative trigger to Strike Trigger Gate Q41, which, together with Strike oscillator Q42, operates identically as the previously described Bass circuit.

When Brush Trigger Gate Q22 is triggered, it turns on Q23 to complete the emitter circuit of Q24, which feeds noise via D26, C28, and buffer stage Q25 to the output.

The remaining rhythm voice to be discussed is the Snare Drum. The Snare Drum sound is obtained by simultaneously gating on the Snare Brush and Drum voices. When a negative pulse is applied to the base of Q26, it saturates transiently, providing the positive trigger for Q28 via R140 and a DC path for Drum oscillator Q30 via D30, enabling it to oscillate.

When Q28 saturates, it provides a DC path for noise amplifier Q29, enabling it to supply its noise output to Q25 via D27. Q25 is the common noise amplifier for the Brush voice and the Brush portion of the Snare Drum.

The noise source output is adjusted by the level set minipot R264 to give the most authentic Snare Drum sound. Once this control has been set, the level of the Brush and Cymbal cannot be changed without destroying the authenticity of the Snare Drum voice.

The Brush portion of the Snare Drum is inhibited by the Snare (Noise) Inhibit Gate Q27, when the following rhythm patterns are selected: Bossa Nova, Rhumba Beguine, Bolero, Samba, Cha-Cha, and Merinque. The Snare (Noise) Inhibit Gate Q27 is saturated by the positive voltage applied to its base via switch contacts and via diode D29 or D28. The collector of Q27, in this case, will remove the trigger pulse from the base of Q28, therefore disabling the Brush portion of the Snare Drum sound.

The output of all voices, via level set resistors and decoupling capacitors, are summed together and applied through Volume potentiometer R115 and the Rhythm Eliminator circuit to the Stationary preamplifier.

The Rhythm Eliminator, or Clamping circuit, located on the preamplifier board assembly, delays the Rhythm Percussion input to the preamplifier circuit. This action is described under the Preamplifier and Expression Control paragraph.

Real Rhythm Theory
(Cont'd.)

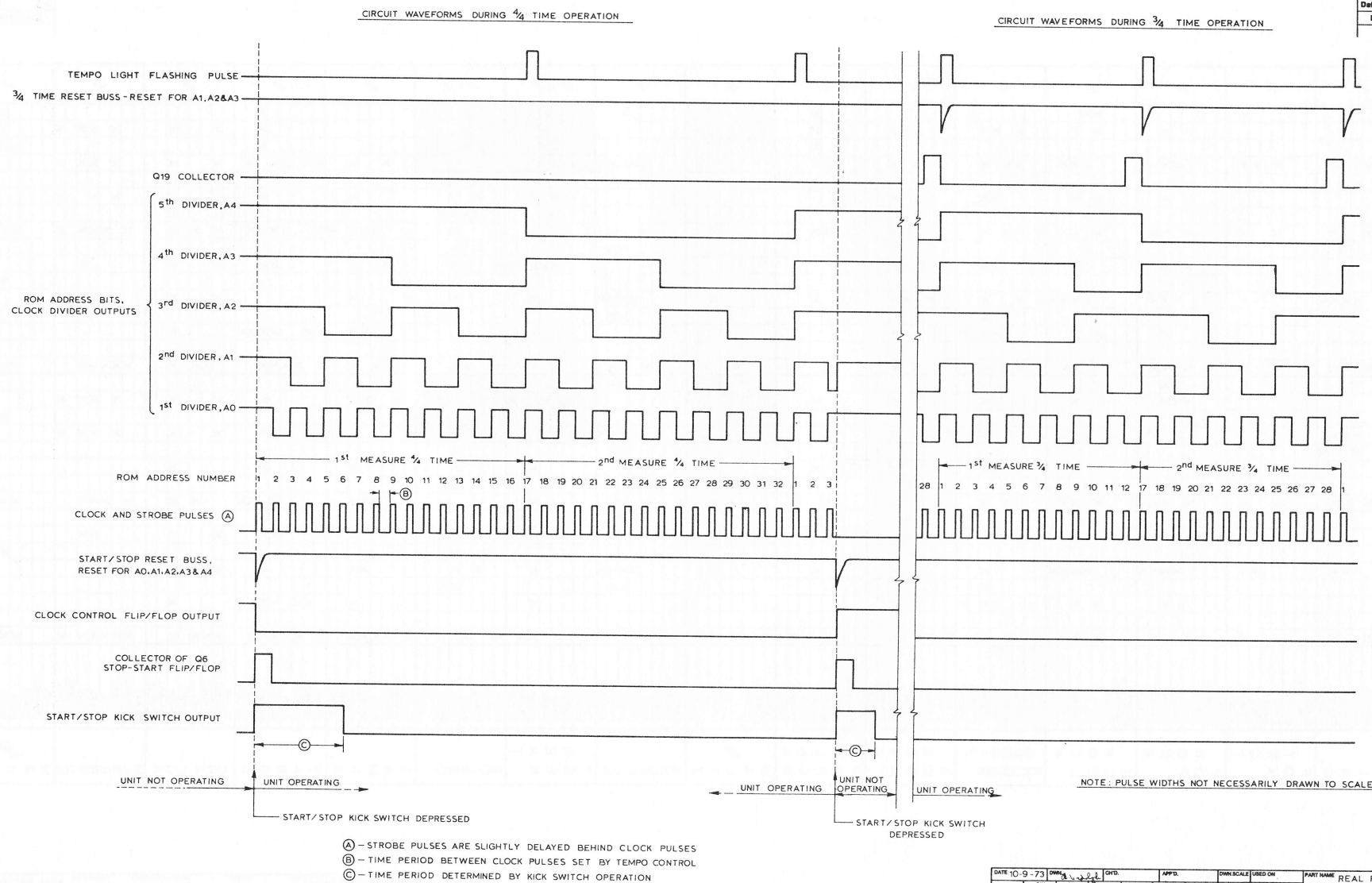
The approximate references of the Real Rhythm voice circuits are given in the chart below.

RHYTHM VOICE	STAGE	FREQUENCY	DURATION OF OSCILLATION
CONGA	Q36	158 Hz	70 ms
BONGO	Q34	500 Hz	10 ms
	Q34- Q20	625 Hz	
BASS	Q40	111 Hz	50 ms
CYMBAL	Q52-Q53- Q54	Lower Freq. Noise	1.0 Sec.
	Q48-Q49-Q50	Higher Freq. Noise	1.0 Sec.
	Q42	5555 Hz	3.5 ms
CLAVE	Q38	2000 Hz	20 ms
BRUSH	Q24-Q25	White Noise	65 ms
ACCENT	Q32	250 Hz	30 ms
SNARE DRUM	Q29-Q25	White Noise	110 ms
	Q30	238 Hz	40 ms
COWBELL	Q44	570 Hz	23 ms
	Q45	1250 Hz	72 ms

The Noise Source, Q55-Q58, supplies approximately 200 mV (P-P) of white noise to the Noise Buss when the minipot is set at maximum C.W. position.

Real Rhythm Counting Sequence Chart

Measure	4/4-Time Rhythms			Count Address Inputs To ROM					3/4-Time Rhythms		
	1/4 Notes	16th Notes	ROM Address Number	A ₄	A ₃	A ₂	A ₁	A ₀	ROM Address Number	16th Notes	1/4 Notes
1 ↓	1	1	1	0	0	0	0	0	1	1	1
		2	2	0	0	0	0	1	2	2	
		3	3	0	0	0	1	0	3	3	
		4	4	0	0	0	1	1	4	4	
	2	5	5	0	0	1	0	0	5	5	2
		6	6	0	0	1	0	1	6	6	
		7	7	0	0	1	1	0	7	7	
		8	8	0	0	1	1	1	8	8	
	3	9	9	0	1	0	0	0	9	9	3
		10	10	0	1	0	0	1	10	10	
		11	11	0	1	0	1	0	11	11	
		12	12	0	1	0	1	1	12	12	
	4	13	13	0	1	1	0	0	NOT USED		
		14	14	0	1	1	0	1			
		15	15	0	1	1	1	0			
		16	16	0	1	1	1	1			
2 ↓	1	1	17	1	0	0	0	0	17	1	1
		2	18	1	0	0	0	1	18	2	
		3	19	1	0	0	1	0	19	3	
		4	20	1	0	0	1	1	20	4	
	2	5	21	1	0	1	0	0	21	5	2
		6	22	1	0	1	0	1	22	6	
		7	23	1	0	1	1	0	23	7	
		8	24	1	0	1	1	1	24	8	
	3	9	25	1	1	0	0	0	25	9	3
		10	26	1	1	0	0	1	26	10	
		11	27	1	1	0	1	0	27	11	
		12	28	1	1	0	1	1	28	12	
	4	13	29	1	1	1	0	0	NOT USED		
		14	30	1	1	1	0	1			
		15	31	1	1	1	1	0			
		16	32	1	1	1	1	1			

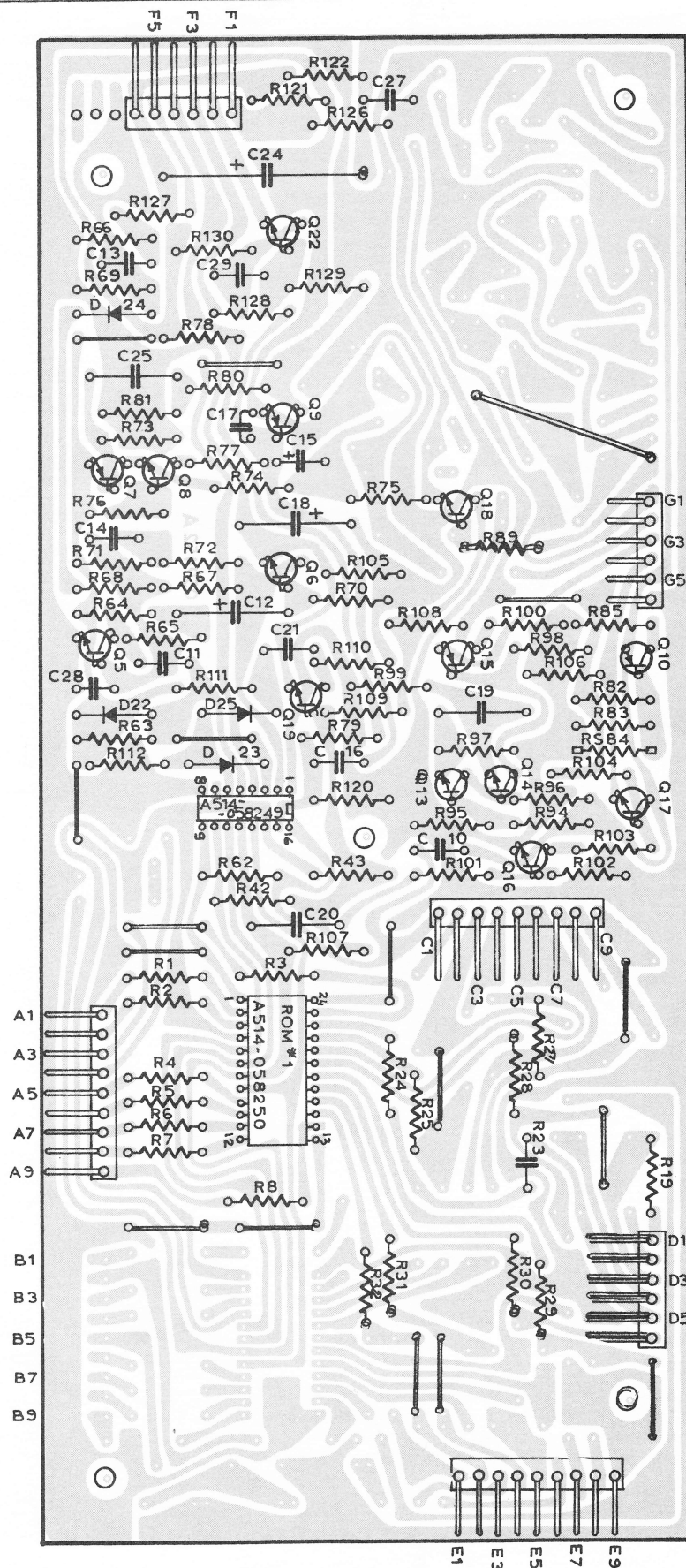


NOTE: PULSE WIDTHS NOT NECESSARILY DRAWN TO SCALE

- (A) - STROBE PULSES ARE SLIGHTLY DELAYED BEHIND CLOCK PULSES
- (B) - TIME PERIOD BETWEEN CLOCK PULSES SET BY TEMPO CONTROL
- (C) - TIME PERIOD DETERMINED BY KICK SWITCH OPERATION

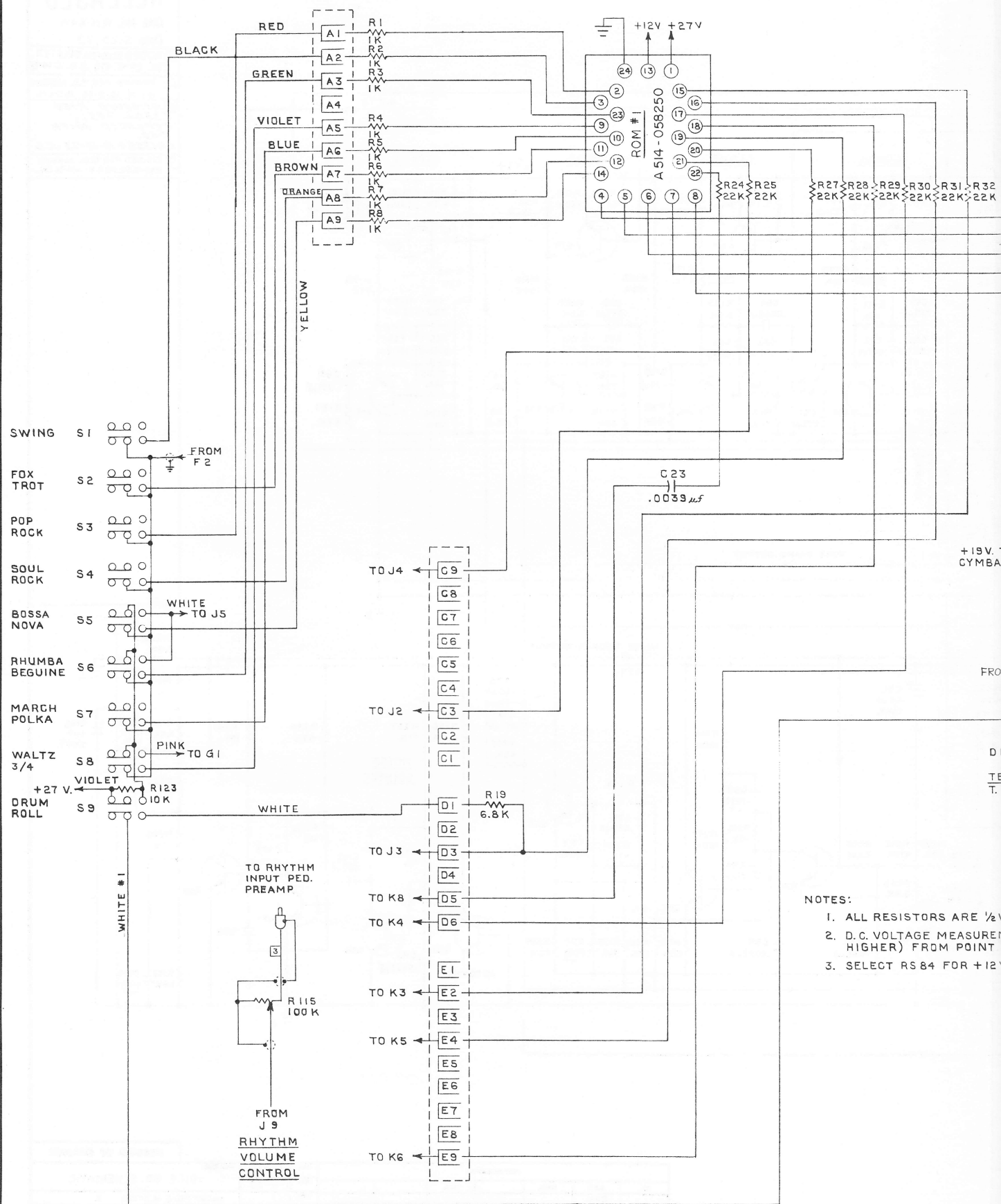
DATE 10-9-73		OWN	GHTD.		APPD.		OWN SCALE		USED ON		PART NAME		
FRONT		CIN.	GR.	CON.	FAY.	DEQ.	E P T		REG.		REAL RHYTHM		
DIRECTION									FINISH		LOGIC WAVEFORM CHART		
											OR		
											BAL		
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<p>LESS OTHERS SPECIFIED TO TOLERANCES ARE DECIMAL $\pm .006$ FRACTIONAL $\pm .016$ ANGLES $\pm .1^\circ$</p>										BALDWIN PIANO & ORGAN CO. INC.		CINCINNATI, OHIO	
										D 579-400			

REAL RHYTHM LOGIC BOARD ASSY. - C500-060174
 Schematic № D501-059157



DATE: 10-11-73
 DWN: A. V. Z. L.

FIGURE 52



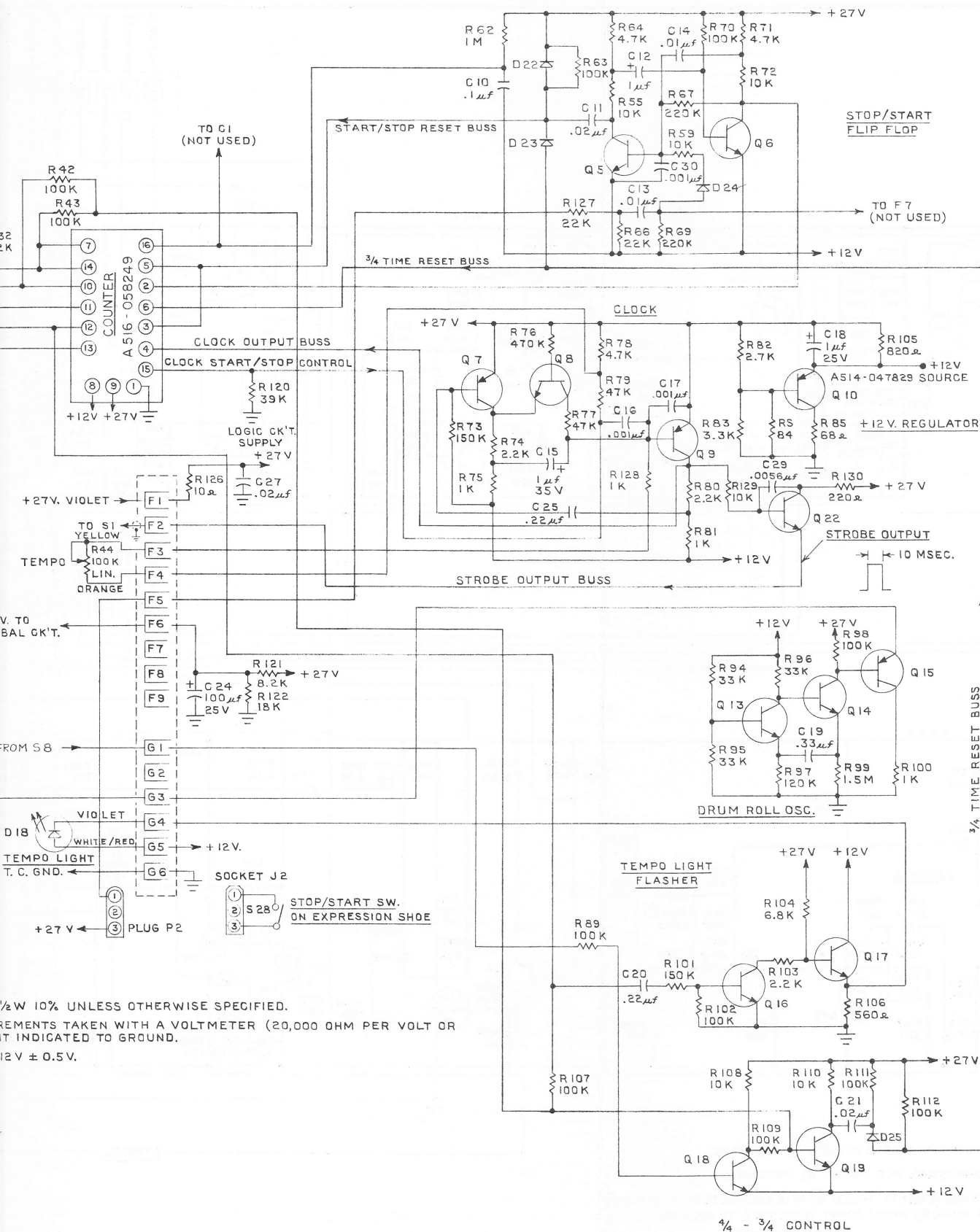
RELEASED

Ord. No. C.N. 15,591
Date 10/17/73

RECORD OF CHANGE

A) DELETED H1 THRU H6.
ROUTED CKT. FROM R89
(100K) TO G1. PINK WIRE
OFF S8 DID GO TO H6.
CHANGED TO G1.
C.N. 15728 H.C.R. 3/13/74

B) R94 & R95 WERE 330K.
C.N. 15,818 4-15-74 W.R.M.

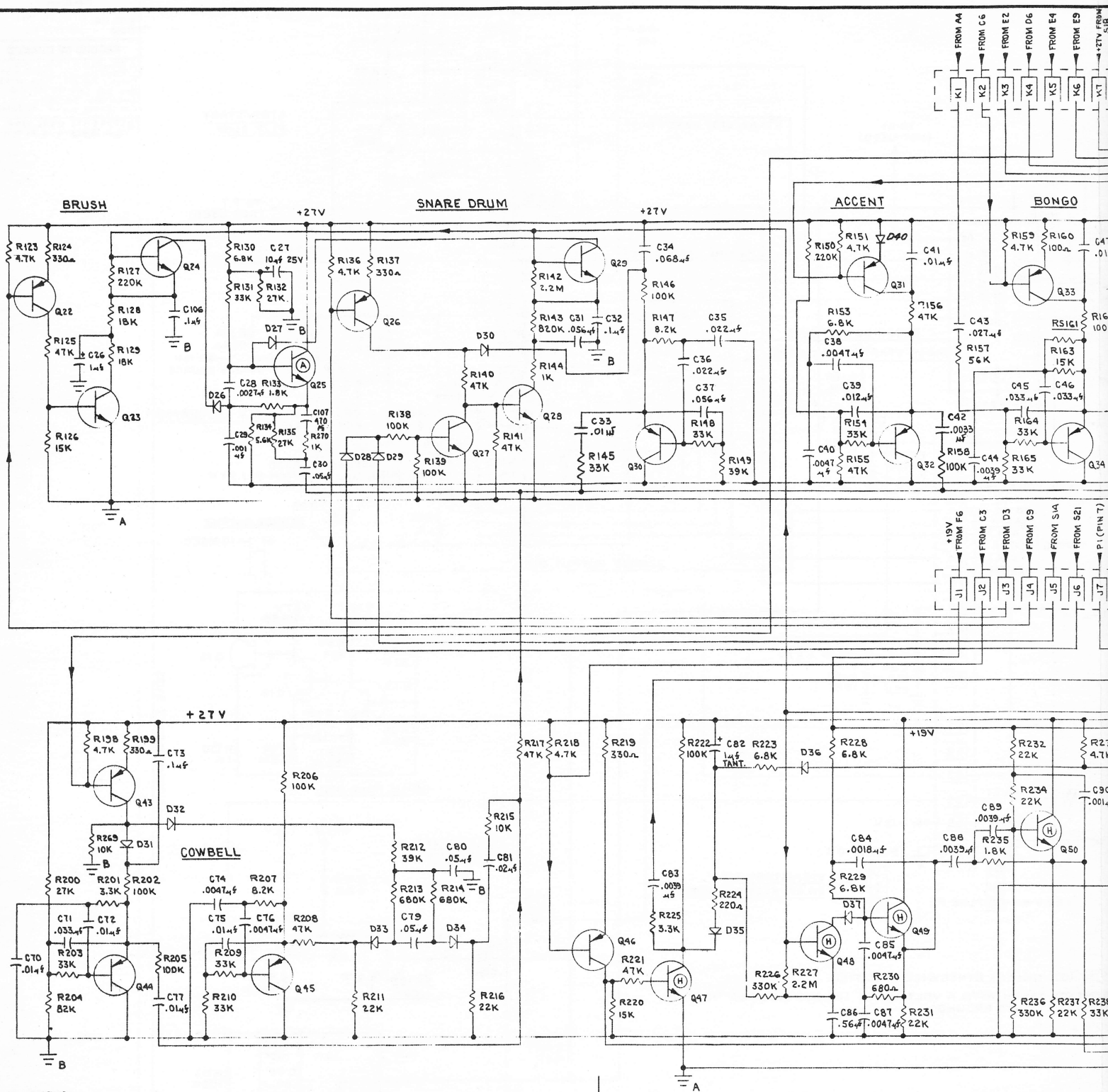


DATE	10-9-73	DWN.	W. R. MAYHEW	CH'D.	Edk	APP'D.	Edk	DWN.	SCALE	USED ON	TMD	PART NAME	LOGIC BOARD & CONTROL HEAD SCHEMATIC
PRINT	CIN.	GR.	CON.	FAY.	DEQ.	E.P.T.				REQ.	~		
DISTRIBUTION	S			SBL	SBL					FINISH		BM503-TMD-2 GR. NOTED IT.	
NEXT ASSEM.												SUPERSEDES	
Baldwin Piano & Organ Co. Cincinnati, Ohio												D	501-060168 B

COMPONENT NO.				
S	Q	R	C	D
28	22	130	30	25

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UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ±.005 FRACTIONAL ±.015 ANGLE ±1°



NOTES:

1. ALL RESISTORS 1/2W 10% UNLESS OTHERWISE SPECIFIED.
2. SELECT NPN TRANSISTORS PER S429- AS INDICATED.
3. D.C. VOLTAGE MEASUREMENTS TAKEN WITH A VOLTMETER (20,000 OHM PER VOLT OR HIGHER) FROM POINT INDICATED TO GROUND.
4. SELECT RS161, RS169 & RS177 PER S677

RELEASED

Ord. No. RN 640

Date 5-29-73

A) ADDED R265, 270, DELETED

C78, CN15, 412 D.D. G-14-73

B) REVISED PER T.S. REQUEST

NO C.N. 10-9-73 D.DIEHL

C) REMOVED R152

(330Ω RES)

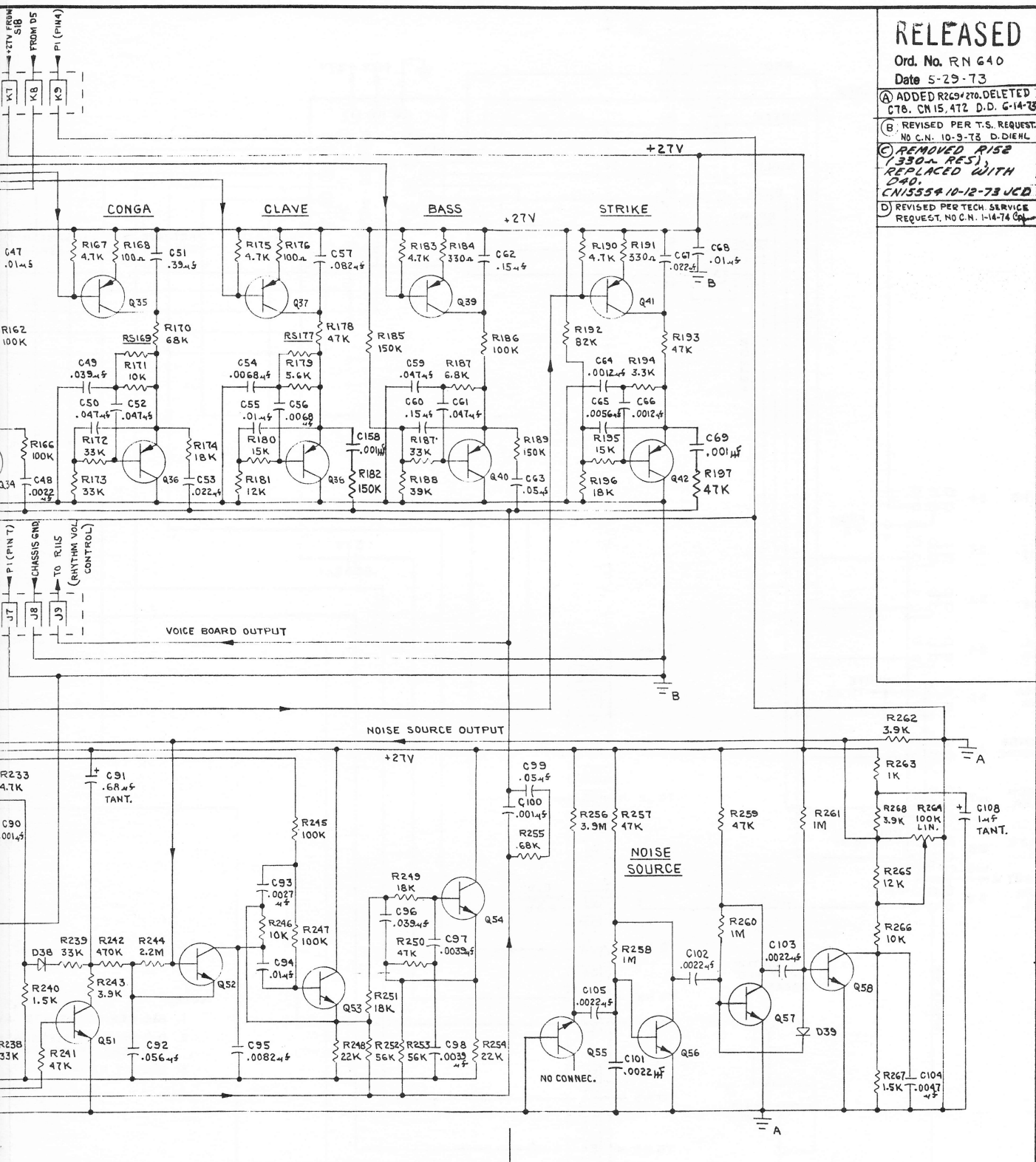
REPLACED WITH

D40.

CN15554-10-12-73 JCD

D) REVISED PER TECH SERVICE

REQUEST, NO C.N. 1-14-74



RECORD OF CHANGE

PART DISTRIBUTION						DATE		PART NAME	
S.V.	S.E.A.	S.O.D.A.	S.L.	S.L.	S.L.	4-6-73	VOICE BD. SCHEMATIC		
5BL									
5BL									
S									
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UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:						DECIMAL & .005 FRACTIONAL & .015		ANGLE & 14°	
COMP. NOS.						D.H. BALDWIN CO.		CINCINNATI, OHIO	
R123-R270						D		501-059244	
C26-C108									
Q22-Q58									
D26-D40									

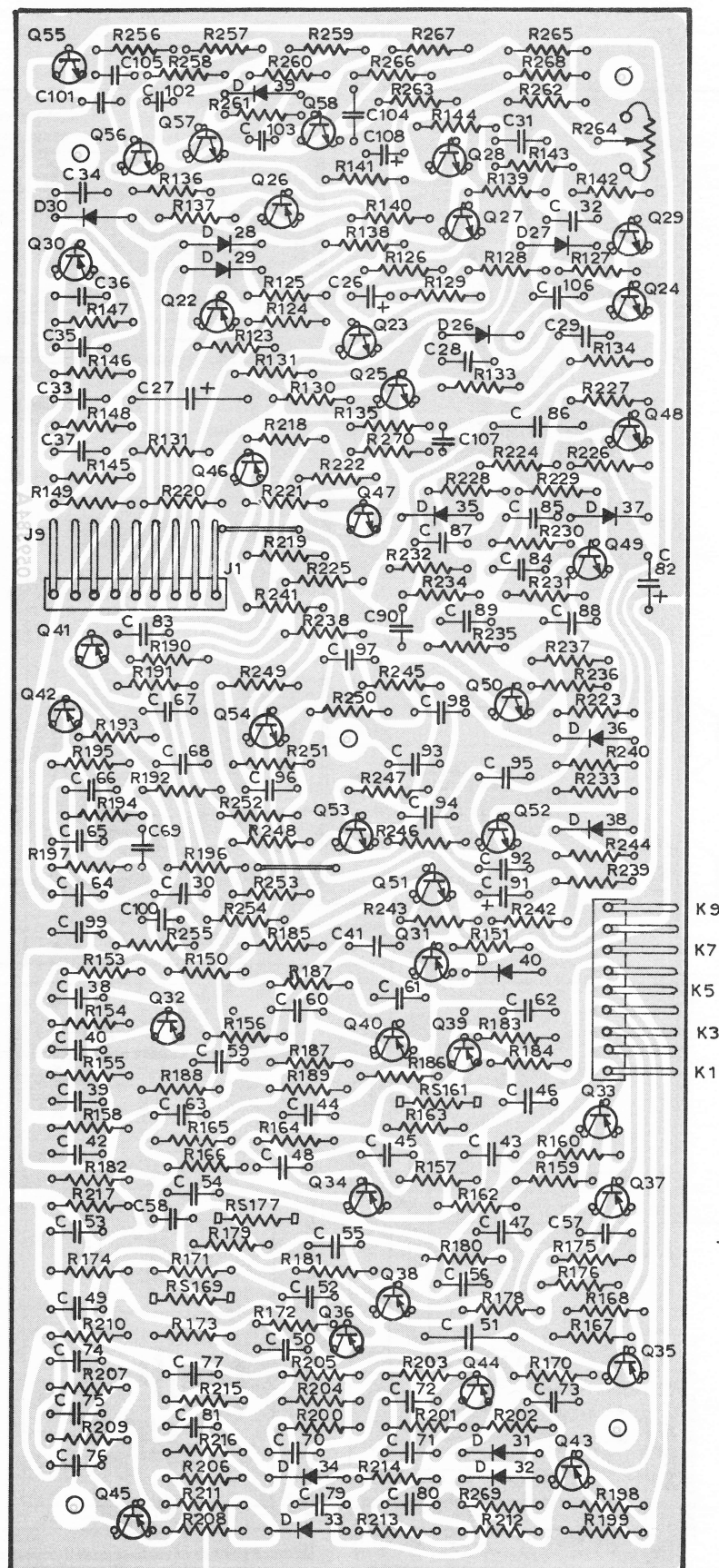
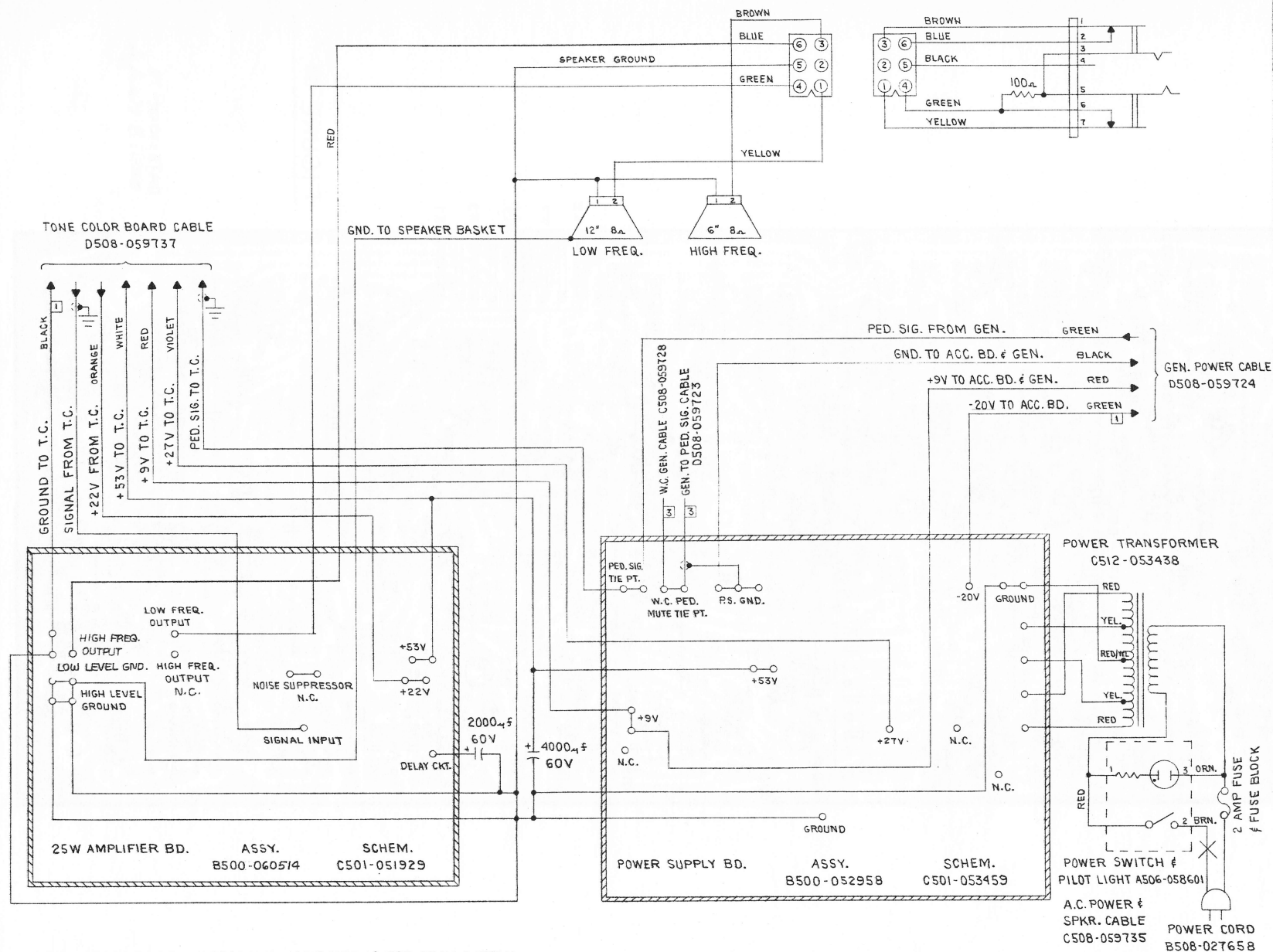


FIGURE 53

DATE: 10-22-73
DWN: B. R. [Signature]



NOTE: REFER TO B501-059967 FOR MODIFICATIONS FOR 230V SUPPLY.

RELEASED
Ord. No. C.N. 15,599
Date // 12/73
RECORD OF CHANGE
A) ASSY B500-060514 WAS
B500-051926. DELETED 25 μ f
50V FROM CROSSOVER NET-
WORK & RELOCATED HIGH
FREQ. CONNECTION.
CN 15,891 DP 5-19-74

DATE 10-18-73	OWN. D. DIEHL	CHD. <i>Red</i>	APPD. <i>Red</i>	DWN. SCALE	USED ON N124.12 ORGAN # AC2	PART NAME POWER CIRCUIT DIAGRAM
PRINT DISTRIBUTION S	CIN. GR.	CON. SBL-1BR	FAY. SBL	DIG. SBL	E. P. T.	FINISH BM N/24-2 GR. IT.
<small>ALL DRAWINGS AND SPECIFICATIONS ARE AND REMAIN THE PROPERTY OF THE BALDWIN PIANO & ORGAN CO. AND MUST BE RETURNED TO IT. ALL SPECIFICATIONS ARE CONFIDENTIAL AND ARE NOT TO BE DISCLOSED TO ANY PERSONS OTHER THAN THOSE TO WHOM THEY ARE SENT. NO DRAWINGS, SPECIFICATIONS OR OTHER DATA BELONGING TO THE BALDWIN PIANO & ORGAN CO. WHICH MAY BE FURNISHED TO MANUFACTURERS OR OTHERS FOR ANY PURPOSE ARE TO BE REPRODUCED BY APPLICATION OR OTHERWISE AS IN ANY MANNER, INCLUDING THE EXCLUSION OF ANY OTHER PERSON OR CORPORATION OR COMPANY, WITHOUT THE WRITTEN PERMISSION OF THE BALDWIN PIANO & ORGAN CO.</small>						NEXT ASSEM. SUPERSEDES BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL 2.005 FRACTIONAL 2.015 ANGLE 2.14"						C 501-060238 A

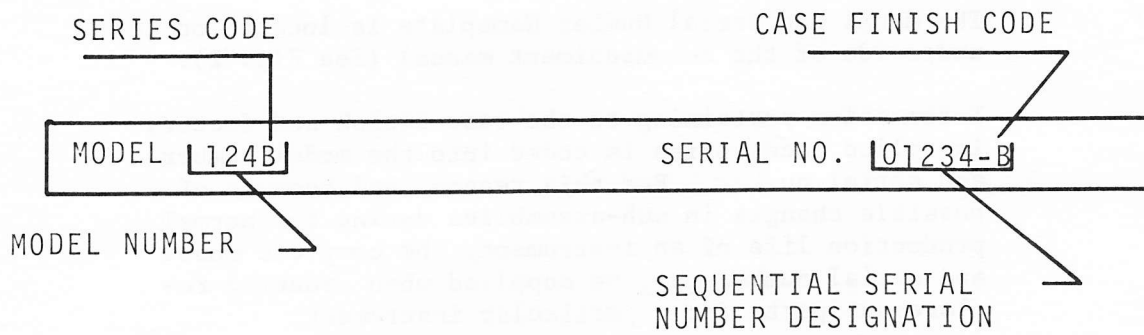
M O D E L 124

PARTS LIST

The Model and Serial Number Nameplate is located on the underside of the Accompaniment manual (See Fig. 2).

Information pertaining to the case finish and factory installed accessories is coded into the model number and serial number. For this reason, and because of possible changes in sub-assemblies during the normal production life of an instrument, the complete model and serial number must be supplied when ordering replacement parts for a particular instrument.

MODEL AND SERIAL NUMBER CODE
FOR THE 124 SERIES ORGAN



SERIES CODE

A	WITH AUTO RHYTHM
B	WITH WONDERCHORD
C	WITH CASSETTE

MODEL AND CASE FINISH CODE

STYLE: Contemporary
FINISH: B - Walnut

MODEL 124 SERIES PARTS LIST

GENERATOR

ITEM NO.	PART NUMBER	PART DESCRIPTION
351- 1	X-500-048697	Generator Sub Assembly No. 1 - C#D
351- 2	X-500-048698	Generator Sub Assembly No. 2 - D#E
351- 3	X-500-048699	Generator Sub Assembly No. 3 - F#F
351- 4	X-500-048700	Generator Sub Assembly No. 4 - G#G
351- 5	X-500-048701	Generator Sub Assembly No. 5 - A#A
351- 6	X-500-048702	Generator Sub Assembly No. 6 - BC
351- 7	B-500-053253	Accessory Board Assembly - 124AC-B-BC-N124AC - N124BC . . .
351- 8	B-500-053858	Accessory Board Assembly - 124A - N124A - N124B
351- 9	B-512-047800	Variable Inductor
351-10	A-514-047801	Frequency Divider - 7 Stage
351-11	A-514-044910	Transistor - PNP - Silicon
351-12	A-514-033338	Transistor - TRN3
351-13	A-514-047828	Transistor - NPN - Power
351-14	A-509-048638	Resistor Pack
351-15	S-240-121005	Resistor - 120 Ohm - 5 Watt
351-16	S-240-250005	Resistor - 25 Ohm - 5 Watt
351-17	S-211-025001	Capacitor, Electrolytic 1 mfd @ 25V
351-18	S-211-006010	Capacitor, Electrolytic 10 mfd @ 6V
351-19	S-211-006050	Capacitor, Electrolytic 50 mfd @ 6V
351-20	S-211-025050	Capacitor, Electrolytic 50 mfd @ 25V
351-21	S-211-025100	Capacitor, Electrolytic 100 mfd @ 25V
351-22	S-205-000471	Capacitor, Ceramic 470 mmfd @ 500V
351-23	S-205-000203	Capacitor, Ceramic .02 mfd @ 500V
351-24	S-205-000103	Capacitor, Ceramic .01 mfd @ 500V
351-25	S-232-001684	Capacitor, Dipped Mylar .68 mfd @ 100V
351-26	S-232-001474	Capacitor, Dipped Mylar .47 mfd @ 100V
351-27	S-232-001394	Capacitor, Dipped Mylar .39 mfd @ 100V
351-28	S-232-001334	Capacitor, Dipped Mylar .33 mfd @ 100V
351-29	S-232-001274	Capacitor, Dipped Mylar .27 mfd @ 100V
351-30	S-232-001224	Capacitor, Dipped Mylar .22 mfd @ 100V
351-31	S-232-001184	Capacitor, Dipped Mylar .18 mfd @ 100V
351-32	S-411-001333	Capacitor, Polymylar .033 mfd @ 100V
351-33	S-411-001273	Capacitor, Polymylar .027 mfd @ 100V
351-34	S-411-001223	Capacitor, Polymylar .022 mfd @ 100V
351-35	S-411-001183	Capacitor, Polymylar .018 mfd @ 100V
351-36	S-411-001153	Capacitor, Polymylar .015 mfd @ 100V
351-37	S-411-001123	Capacitor, Polymylar .012 mfd @ 100V
351-38	A-528-051905	Heat Sink

POWER SUPPLY

352- 1	B-500-052958	Power Supply Board Assembly
352- 2	B-500-051926	Amplifier Board Assembly - 25 Watt
352-28	B-500-060514	Amplifier Board Assembly - 25 Watt - N124
352- 3	B-528-051906	Heat Sink
352- 4	A-237-051596	Component Clip
352- 5	A-514-033338	Transistor - TRN3
352- 6	A-514-047830	Transistor - NPN - Power
352- 7	A-514-047829	Transistor - PNP - Power
352- 8	A-514-047828	Transistor - NPN - Power
352- 9	A-514-044910	Transistor - PNP - Silicon
352-29	B-507-033322	Transistor Socket
352-30	A-514-033359	Transistor Mica Insulator
352-31	A-514-054214	Transistor - NPN - Power
352-10	A-514-042791	Diode - Medium Voltage
352-11	A-514-047970	Diode - Zener
352-12	A-514-038984	Rectifier - 3 Amp - Silicon
352-13	A-514-035596	Rectifier - Silicon
352-14	S-240-7R5005	Resistor - 7.5 Ohm - 5 Watt
352-15	S-240-250020	Resistor - 25 Ohm - 20 Watt
352-32	S-240-250020	Resistor - 25 Ohm - 25 Watt
352-16	S-211-025005	Capacitor, Electrolytic 5 mfd @ 25V
352-17	S-211-025025	Capacitor, Electrolytic 25 mfd @ 25V
352-18	S-211-025050	Capacitor, Electrolytic 50 mfd @ 25V
352-19	S-211-025100	Capacitor, Electrolytic 100 mfd @ 25V
352-20	S-211-015100	Capacitor, Electrolytic 100 mfd @ 15V
352-21	S-211-025500	Capacitor, Electrolytic 500 mfd @ 25V
352-22	A-517-051652	Capacitor, Electrolytic 2000 mfd @ 40V
352-33	S-211-050100	Capacitor, Electrolytic 100 mfd @ 50V
352-23	A-514-033375	Fuse Wire
352-24	C-512-053438	Transformer - Power
352-25	B-517-038985	Capacitor, Electrolytic 4000 mfd @ 60V
352-26	S-211-050050	Capacitor, Electrolytic 50 mfd @ 50V
352-27	A-237-019612	Capacitor Mounting Clip

MODEL 124 SERIES PARTS LIST

TONE COLOR ASSEMBLY

ITEM NO.	PART NUMBER	PART DESCRIPTION
353- 1	X-500-053205	Tone Color Assembly - 124A - 124AC
353- 2	X-500-053206	Tone Color Assembly - 124B - 124BC
353-29	X-500-059909	Tone Color Assembly - N124R - N124B - Above Serial #12266 .
353-30	X-500-059945	Tone Color Assembly - N124RC-N124BC - Above Serial #12266 .
353- 3	B-506-053234	Tone Color Switch Board - Pedal - 124A - 124AC
353- 4	B-506-053576	Tone Color Switch Board - Pedal - 124B - 124BC
353- 5	A-506-053057	Tone Color Switch Board - Accomp. - All 124
353- 6	B-506-053238	Tone Color Switch Board - Solo - All 124
353- 7	C-500-053371	Tone Color Switch Assembly - Pedal - 124A - 124AC
353- 8	C-500-053577	Tone Color Switch Assembly - Pedal - 124B, 124BC, N124 Series .
353- 9	B-500-053099	Tone Color Switch Asy. - Accomp. - All 124 & N124 Series . .
353-10	C-500-053286	Tone Color Switch Asy. - Solo - All 124 & N124 Series . . .
353-11	A-249-052050	Nameplate - Pedal
353-12	A-249-052051	Nameplate - Accomp.
353-13	A-249-052052	Nameplate - Solo
353-14	A-249-052192	Nameplate - Baldwin
353-15	A-506-033399	Contact Wire - Spring Type
353-16	A-506-037787	Contact Wire
353-17	A-237-037146	Detent Spring
353-18	B-506-052168	Power Switch - Push-Push Type
353-19	B-502-053982	Power Switch Cover
353-31	A-506-058601	Power Switch - Rocker Type
353-32	A-528-059872	Tone Color Hold Down
353-33	A-514-000004	Fuse Holder
353-34	A-514-032101	Fuse - 2 Amp - Slo-Blo
353-20	A-247-024947	Speed Clip - "S" Type
353-21	A-237-037993	Tab Spring Retainer
353-22	A-250-037943	Tab Insert
353-23	A-247-037073	Screw - Special - #6-32
353-24	A-509-040783	Potentiometer - 100K
353-25	A-244-026947	Felt - 1/3" X 1/8"
353-26	A-514-036777	Circuit Breaker
353-27	B-508-027658	Power Cord
353-28	A-247-053242	Screw - #4-40 - Type #1 - 1/4" - Special

COMPONENT BOARDS

354- 1	B-500-053465	Solo Filter Board Assembly
354- 2	B-500-053185	Pedal & Accompaniment Filter Board Assembly - 124A & 124AC .
354- 3	B-500-053189	Pedal & Accompaniment Filter Board Assembly - 124B & 124BC .
354- 4	C-500-053421	Preamp Board Assembly
354- 5	C-500-053499	Rhythm Voice Board Assembly - IN124B - IN 124BC
354- 6	X-500-053634	Auto Rhythm Trigger Board Assembly - 124A & 124AC
354- 7	B-500-053966	Muted Reed Board - 124B & 124BC
354-63	C-500-059782	Tone Color Board Assembly - Above Serial #12266
354-64	A-507-059125	Connector - Konektcon - 6 Connection
354- 8	A-514-042791	Diode - Medium Voltage
354- 9	A-514-033338	Transistor - TRN3
354-10	A-514-047828	Transistor - NPN - Power
354-11	A-514-044910	Transistor - PNP
354-12	A-509-032976	Resistor Pack
354-13	B-509-041912	Mini-Pot - 100K
354-14	S-211-025001	Capacitor, Electrolytic 1 mfd @ 25V
354-15	S-211-025005	Capacitor, Electrolytic 5 mfd @ 25V
354-16	S-211-025010	Capacitor, Electrolytic 10 mfd @ 25V
354-17	S-211-025025	Capacitor, Electrolytic 25 mfd @ 25V
354-18	S-211-006050	Capacitor, Electrolytic 50 mfd @ 6V
354-19	S-211-050050	Capacitor, Electrolytic 50 mfd @ 50V
354-20	S-211-050500	Capacitor, Electrolytic 500 mfd @ 50V
354-21	S-211-050100	Capacitor, Electrolytic 100 mfd @ 50V
354-22	S-211-025050	Capacitor, Electrolytic 50 mfd @ 25V
354-23	A-514-053981	O.P. Amp Integrated Circuit
354-24	S-217-000121	Capacitor, Styrene 120 pfd
354-25	S-217-000331	Capacitor, Styrene 330 pfd
354-26	S-232-001102	Capacitor, Dipped .001 uf
354-27	S-232-001122	Capacitor, Dipped .0012 uf
354-28	S-232-001152	Capacitor, Dipped .0015 uf
354-29	S-232-001182	Capacitor, Dipped .0018 uf
354-30	S-232-001222	Capacitor, Dipped .0022 uf
354-31	S-232-001272	Capacitor, Dipped .0027 uf
354-32	S-232-001332	Capacitor, Dipped .0033 uf
354-33	S-232-001392	Capacitor, Dipped .0039 uf
354-34	S-232-001472	Capacitor, Dipped .0047 uf

MODEL 124 SERIES PARTS LIST

COMPONENT BOARDS

ITEM NO.	PART NUMBER	PART DESCRIPTION
354-35	S-232-001562	Capacitor, Dipped .0056 uf
354-36	S-232-001682	Capacitor, Dipped .0068 uf
354-37	S-232-001822	Capacitor, Dipped .0082 uf
354-38	S-232-001103	Capacitor, Dipped .010 uf
354-39	S-232-001123	Capacitor, Dipped .012 uf
354-40	S-232-001153	Capacitor, Dipped .015 uf
354-41	S-232-001183	Capacitor, Dipped .018 uf
354-42	S-232-001223	Capacitor, Dipped .022 uf
354-43	S-232-001273	Capacitor, Dipped .027 uf
354-44	S-232-001333	Capacitor, Dipped .033 uf
354-45	S-232-001393	Capacitor, Dipped .039 uf
354-46	S-232-001473	Capacitor, Dipped .047 uf
354-47	S-232-001563	Capacitor, Dipped .056 uf
354-48	S-232-001683	Capacitor, Dipped .068 uf
354-49	S-232-001823	Capacitor, Dipped .082 uf
354-50	S-232-001104	Capacitor, Dipped .10 uf
354-51	S-232-001124	Capacitor, Dipped .12 uf
354-52	S-232-001154	Capacitor, Dipped .15 uf
354-53	S-232-001184	Capacitor, Dipped .18 uf
354-54	S-232-001224	Capacitor, Dipped .22 uf
354-55	S-232-001274	Capacitor, Dipped .27 uf
354-56	S-232-001334	Capacitor, Dipped .33 uf
354-57	S-232-001394	Capacitor, Dipped .39 uf
354-58	S-232-001474	Capacitor, Dipped .47 uf
354-59	S-232-001564	Capacitor, Dipped .56 uf
354-60	S-232-001684	Capacitor, Dipped .68 uf
354-61	S-232-001824	Capacitor, Dipped .82 uf
354-62	S-232-001105	Capacitor, Dipped 1.0 uf

STOP TABLET SET

355- 1	B-250-053268	Stop Tablet Set - 124A - 124AC - N124
355-41	B-250-053270	Stop Tablet Set - 124B - 124BC
355- 2	X-250-041290	Light Vibrato
355- 3	X-250-041291	Full Vibrato
355- 4	X-250-053589	Bass - Soft PEDAL
355- 5	X-250-053590	Bass - Medium
355- 6	X-250-053591	Bass - Full
355- 7	X-250-051986	Diapason 8'
355- 8	X-250-044157	Flute 8' ACCOMPANIMENT
355- 9	X-250-051987	String 8'
355-10	X-250-051989	Flute 4'
355-11	X-250-051990	Reverb
355-12	X-250-051991	Flute 16'
355-13	X-250-053592	Cello 16'
355-14	X-250-053593	Saxophone 16'
355-15	X-250-044157	Flute 8' SOLO
355-16	X-250-051987	String 8'
355-17	X-250-051993	Clarinet 8'
355-18	X-250-053594	Flute Accent
355-19	X-250-053595	Reed String Accent
355-20	X-250-053596	Bright Tone Deep
355-21	B-250-053270	Stop Tablet Set - 124B - 124BC
355-22	X-250-041290	Light Vibrato
355-23	X-250-041291	Full Vibrato
355-24	X-250-047895	String Bass PEDAL
355-25	X-250-038739	Loud Pedal Soft
355-26	X-250-038736	Pedal Sustain
355-27	X-250-051986	Diapason 8'
355-28	X-250-044157	Flute 8'
355-29	X-250-051987	String 8' ACCOMPANIMENT
355-30	X-250-051989	Flute 4'

MODEL 124 SERIES PARTS LIST

STOP TABLET SET

ITEM NO.	PART NUMBER	PART DESCRIPTION
355-31	X-250-051990	Reverb
355-32	X-250-051991	Flute 16'
355-33	X-250-053592	Cello 16'
355-34	X-250-053593	Sazophone 16'
355-35	X-250-044157	Flute 8' SOLO
355-36	X-250-051987	String 8'
355-37	X-250-051993	Clarinet 8'
355-38	X-250-053594	Flute Accent
355-39	X-250-053595	Reed String Accent
355-40	X-250-053596	Bright Tone Deep

MANUAL ASSEMBLIES

356- 1	X-500-053204	Manual Assembly - Solo - 124A - 124AC
356- 2	X-500-053958	Manual Assembly - 124B - 124BC
356-53	X-500-059891	Manual Assembly - Solo - N124A - N124AC - 124R - 124RC
356-54	X-500-059892	Manual Assembly - Solo - N124B - N124BC
356-55	D-500-053201	Manual Assembly - Acc. - 124A - 124AC
356-56	D-500-053200	Manual Assembly - Acc. - 124B - 124BC
356-57	D-500-059886	Manual Assembly - Acc. - N124A - N124AC - 124R - 124RC
356-58	D-500-059885	Manual Assembly - Acc. - N124B - N124Bc
356- 3	B-250-054322	Natural Key Assembly - C
356- 4	B-250-054323	Natural Key Assembly - D
356- 5	B-250-054324	Natural Key Assembly - E
356- 6	B-250-054325	Natural Key Assembly - F
356- 7	B-250-054326	Natural Key Assembly - G
356- 8	B-250-054327	Natural Key Assembly - A
356- 9	B-250-054328	Natural Key Assembly - B
356-10	B-250-054329	Natural Key Assembly - Wide C
356-11	B-250-054330	Sharp Key Assembly
356-12	B-250-054321	Key Channel Assembly
356-13	C-500-053176	Keyslip Assembly - Accompaniment - WonderChord
356-14	B-500-052666	Actuator Bar Assembly - WonderChord
356-15	A-244-052672	Gasket
356-16	B-500-053451	Phone Jack Assembly - 124A - 124AC
356-59	B-500-059884	Phone Jack Assembly - 124B - 124BC
356-60	B-500-060236	Phone Jack Assembly - 124R - 124RC
356-17	B-500-049039	Edge Connector Board Assembly
356-18	B-528-023045	Upstop Bar - F-C
356-19	B-528-022465	Upstop Bar - F-E
356-20	X-250-041044	Natural Keycap - C
356-21	X-250-041045	Natural Keycap - D
356-22	X-250-041046	Natural Keycap - E
356-23	X-250-041047	Natural Keycap - F
356-24	X-250-041048	Natural Keycap - G
356-25	X-250-041049	Natural Keycap - A
356-26	X-250-041050	Natural Keycap - B
356-27	X-250-041051	Natural Keycap - Wide C
356-28	C-250-025895	Sharp Keycap
356-29	A-244-022488	Key Switch Bumper
356-30	A-244-023942	Key Upstop Bumper
356-31	C-528-053096	Keyslip - Solo
356-32	C-528-053097	Keyslip - Extension
356-33	D-528-053156	Keyslip - Accompaniment
356-34	D-502-052385	Switch Cover
356-35	B-500-049039	Edge Connector Board Assembly - 28 Contact
356-36	A-506-052616	Micro Switch
356-37	A-244-006211	Felt - .035/.050" X 1/4" - Per Foot
356-38	A-244-028487	Felt - .160/.180" X 3/8" - Per Foot
356-39	A-244-010008	Felt - .113/.137" X 1/2" - Per Foot
356-40	A-244-022607	Felt - Keystop - Lot of 25
356-41	A-244-029612	Felt - Upstop - Per Foot
356-42	A-244-024941	Felt - Keyslip - Per Foot
356-43	A-244-006344	Felt - Per Foot
356-44	A-244-024941	Felt - .240/.260" X 5/16" - Per Foot
356-45	A-247-045899	Mounting Post
356-46	A-247-052681	Speed Nut
356-47	A-247-028484	Nut - #6-32 - Nylock
356-48	A-244-045932	Nylon Washer
356-49	A-237-052680	Actuator Detent for WonderChord Bar
356-50	A-244-040842	Rubber Bumper for WonderChord Bar
356-51	A-247-035550	Fibre Washer
356-52	A-507-038438	Phone Jack Only - 124A - 124AC
356-61	A-507-059887	Phone Jack Only - All Others

MODEL 124 SERIES PARTS LIST

13 NOTE PEDAL ASSEMBLIES

ITEM NO.	PART NUMBER	PART DESCRIPTION
357- 1	D-500-053267	13 Note Pedal Assembly - 124B, 124BC, N124B & R Series . . .
357- 2	D-500-053456	13 Note Pedal Assembly - 124A, 124AC, N124A
357- 3	C-506-048860	5 Note Pedal Sustain Board - 124B, 124BC, N124B & R
357- 4	C-506-048866	8 Note Pedal Sustain Board - 124B, 124BC, N124B & R
357- 5	C-500-047808	5 Note Pedal Sustain Board - 124A, 124AC, N124A
357- 6	C-500-047793	8 Note Pedal Pedal Board - 124AC, N124A
357- 7	A-500-035728	Spring Contact Assembly
357- 8	C-250-032686	Sharp Pedal Assembly
357- 9	B-250-015033	Sharp Pedal Block Cap
357-10	C-250-047968	Natural Pedal Assembly
357-11	A-237-032651	Pedal Spring
357-12	A-247-035735	Pedal Spring - Riveted
357-13	A-247-006163	Rubber Head Nail
357-14	A-506-035033	Stationary Contact Wire
357-15	A-244-031610	Conductive Elastomer Tubing
357-16	S-211-006050	Capacitor, Electrolytic 50 mfd @ 6V
357-17	A-514-033338	Transistor - TRN3
357-18	A-514-044910	Transistor - NPN
357-19	A-514-042791	Diode - Medium Voltage
357-20	A-244-005855	Felt
357-21	A-244-028821	Felt

EXPRESSION PEDAL ASSEMBLY

358- 1	D-500-053250	Expression Pedal Assembly - N124B, N124BC
358-18	D-500-060249	Expression Pedal Assembly - 124R
358-19	D-500-060245	Expression Pedal Assembly - N124A-N124AC
358- 2	A-500-044740	Expression Potentiometer Lever Assembly
358- 3	A-237-036413	Drive Spring Pin
358- 4	B-528-044743	Potentiometer Support Bracket
358- 5	B-509-048890	Potentiometer - 50K
358- 6	A-526-035985	Drive Spring
358- 7	A-237-033321	Expression Pedal Spacer
358- 8	C-244-022513	Expression Pedal Rubber Pad
358- 9	A-525-034469	Vinyl Extrusion - 5" Required
358-10	A-244-028468	Rubber Channel
358-11	A-247-040149	Spring Washer
358-12	A-247-031746	"E" Ring
358-13	A-244-036416	Nylon Shim
358-14	A-247-022975	Elastic STop Nut
358-15	A-247-015188	Nut - 3/8" - 32 Hex
358-16	A-237-036028	Potentiometer Lever Bushing
358-17	A-528-036026	Potentiometer Lever Plate
358-20	A-506-029742	Switch Assembly - 124R
358-21	A-506-014676	Contact Wire - Straight
358-22	A-506-019347	Contact Wire - Bent
358-23	B-506-017068	Contact Wire Mounting Block

KEYCAPS

359- 1	X-500-052471	Accompaniment Treble Keycap Assembly - All
359- 2	X-500-053172	Accompaniment Bass Keycap Assembly - All
359- 3	X-500-052474	Solo Treble Keycap Assembly - All
359- 4	X-500-053199	Solo Bass Keycap Assembly - WonderChord - Prior to #12266
359- 5	X-500-053515	Solo Bass Keycap Assembly - Auto Rhythm - 125A
359-25	X-500-060148	Solo Bass Keycap Assembly - TMD - 125R
359-26	X-500-059900	Solo Bass Keycap Assembly - WonderChord - After #12266
359-27	A-514-058969	L.E.D. Assembly
359-28	X-514-059254	Light Emitting Diode
359-29	X-514-059255	L.E.D. Mounting Clip
359-30	X-514-059256	L.E.D. Mounting Ring
359-31	C-250-052369	End Cap
359-32	B-506-059129	Push Button Switch - 9 Station - TMD - Real Rhythm
359- 6	B-506-053521	Push Button Switch - 6 Station - Auto Rhythm
359- 7	B-506-052775	Push Button Switch - 8 Station - WonderChord
359- 8	A-250-051780	Push Button - White - Auto Rhythm
359- 9	A-250-051782	Push Button - Red - Auto Rhythm
359-10	A-250-051781	Push Button - Black - Auto Rhythm
359-11	A-247-052042	Knob - Volume
359-12	B-509-039731	Potentiometer - 100K - Rev. Audio - Muted Reed
359-13	B-509-040783	Potentiometer - 100K - Tempo
359-14	A-514-047112	Amber Jewel

MODEL 124 SERIES PARTS LIST

KEYCAPS

ITEM NO.	PART NUMBER	PART DESCRIPTION
359-15	A-514-048341	Lamp
359-16	A-507-047110	Lamp Socket
359-17	A-247-047331	Nut - 9/16" - 27
359-18	A-249-052802	Nameplate - WonderChord
359-19	A-249-052048	Nameplate - Tempo
359-20	A-249-052054	Nameplate - Rhythm Volume
359-21	A-249-052400	Nameplate - WonderChord Function
359-22	A-249-053630	Nameplate - Auto Rhythm Function
359-23	A-249-053631	Nameplate - Auto Rhythm
359-24	A-249-053882	Nameplate - Muted Reed
359-33	A-250-054568	Switch Button - Insert Type - Real Rhythm
359-34	A-247-054867	Button Insert - Blue
359-35	A-247-054868	Button Insert - Red
359-36	A-247-054869	Button Insert - Clear
359-37	B-509-047954	Potentiometer - 10K - Rhythm Volume
359-38	A-249-060125	Nameplate - Real Rhythm (TMD) Functions

SWITCH ASSEMBLIES

360- 1	D-500-053191	Solo Switch Assembly
360- 2	D-500-053195	Accompaniment Switch Assembly
360- 3	B-506-048512	13 Note Switch Board Assembly Gate
360- 4	B-506-051621	12 Note Switch Board Assembly - 15K
360- 5	B-506-053145	13 Note Switch Board Assembly - 27K
360- 6	B-506-053146	12 Note Switch Board Assembly - 22K
360- 7	B-506-053144	7 Note Switch Board Assembly - 33K
360- 8	B-506-036821	Wipeout Switch Board Assembly
360- 9	B-500-033961	7 Note Plunger Guide Assembly
360-10	B-500-031584	12 Note Plunger Guide Assembly
360-11	B-500-031585	13 Note Plunger Guide Assembly
360-12	B-506-033145	Switch Plunger - 3 Slot
360-13	B-506-031977	Switch Plunger - 2 Slot
360-14	X-247-031511	Switch Mounting Post - 3 Deck
360-15	A-244-019857	Neoprene Washer
360-16	A-506-039224	Contact Wire - Gold Clad
360-17	A-506-027595	Contact Wire - .018
360-18	B-506-034520	Contact Wire - Right Angle
360-19	A-506-031576	Spacer - .125
360-20	A-506-024323	Spacer - .187
360-21	A-247-053665	Switch Post Washer
360-22	D-500-057495	Accompaniment Switch Assembly - 124A, 124AC

MISCELLANEOUS PARTS

361- 1	C-160-*53436	Bench Assembly
361- 2	C-500-053460	Cassette Driver Assembly
361- 3	A-525-052515	Plastic Extrusion - Cut to Size
361- 4	A-249-053652	Nameplate - INTERLUDE
361- 5	C-512-054035	Transformer - Power - 115/230V
361- 6	B-244-053621	Grille Cloth
361- 7	A-507-042637	Socket - Molex - 15 Pin
361- 8	A-507-044876	Socket - Molex - 12 Pin
361- 9	A-507-044874	Socket - Molex - 9 Pin
361-10	A-507-044897	Socket - Molex - 6 Pin
361-11	A-507-044885	Socket - Molex - 3 Pin
361-12	A-507-042705	Plug - 15 Pin
361-13	A-507-044877	Plug - 12 Pin
361-14	A-507-044875	Plug - 9 Pin
361-15	A-507-044898	Plug - 6 Pin
361-16	A-507-044886	Plug - 3 Pin
361-17	A-516-046572	Molex Terminal - Male - Small
361-18	A-516-046569	Molex Terminal - Female - Small
361-19	A-516-042635	Molex Terminal - Male - Large
361-20	A-516-042630	Molex Terminal - Female - Large
361-21	A-507-027654	Solderless Connector - Single
361-22	A-507-028288	Solderless Connector - Double
361-23	A-507-035841	Solderless Connector - Speaker
361-24	A-507-014681	Phone Jack
361-25	A-507-021804	Phone Shell
361-26	A-507-014682	Phone Plug
361-27	A-508-048246	Tini-Plug Cable Assembly
361-28	A-512-053438	Transformer - Power
361-29	A-244-026947	Felt - 1/2" X .115"
361-30	C-105-053450	Music Desk - Plexiglass
361-31	D-175-053597	Back Panel
361-32	D-500-048516	Reverberation Unit

MODEL 124 SERIES PARTS LIST

MISCELLANEOUS PARTS

ITEM NO.	PART NUMBER	PART DESCRIPTION
361-33	A-513-024925	Speaker - 12" LW 8 Ohm
361-34	A-244-005210	Felt - Maroon - 1/2" X .050"
361-35	A-518-052823	Expression Pedal Trim Moulding
361-36	B-500-053627	Cassette Recorder
361-37	A-244-023596	Grommet Bushing
361-38	A-244-010002	Grommet
361-39	A-244-018281	Nylon Washer
361-40	A-525-041016	Polyethylene Extrusion
361-41	A-528-052518	Cassette Attaching Bracket
361-42	C-500-052888	WonderChord Board No. 2 Assembly
361-43	C-500-052519	Recorder Drawer Sling
361-44	B-500-049039	Edge Connector Board Assembly - 28
361-45	B-516-046224	Edge Connector - 2 Leg
361-46	A-504-049038	Edge Connector Wedge
361-47	A-504-057432	Edge Connector Guide Strip
361-48	A-513-054664	Speaker - 6"
361-49	A-513-024925	Speaker - 12" LW 8 Ohm
361-50	B-517-038985	Capacitor, Electrolytic 4000 mfd @ 60V
361-51	B-517-047881	Capacitor, Electrolytic 2000 mfd @ 60V
361-52	A-514-059976	Fuse Holder
361-53	A-517-039382	Capacitor, Electrolytic 25 mfd @ 50V
361-54	A-508-027658	Power Cord
361-55	A-506-058921	Power Switch - Rocker Type - Export Only
361-56	C-512-054035	Power Transformer - 120/240V @ 50/60 Hz - Export Only
361-57	C-512-059907	Power Transformer - 100V PRI @ 50/60 Hz - Export Only

REAL RHYTHM

422- 1	X-500-060225	Real Rhythm Assembly - (TMD)
422- 2	C-500-059386	Voice Board Assembly
422- 3	C-500-060174	Logic Board Assembly
422- 4	A-507-059127	Konektion Interconnect - 9 Conn.
422- 5	A-507-059125	Konektion Interconnect - 6 Conn.
422- 6	B-509-041912	Mini-Pot - 100K
422- 7	A-514-033338	Transistor - TRN3 - NPN - Silicon
422- 8	A-514-044910	Transistor - PNP - Silicon
422- 9	A-514-047829	Transistor - PNP - Silicon - Medium Power
422-10	A-514-042791	Diode - Medium Voltage
422-11	A-514-058250	Rhythm Pattern Generator #1
422-12	A-514-058249	Rhythm Counter
422-13	S-232-001102	Capacitor, Mylar .0010 uf
422-14	S-232-001122	Capacitor, Mylar .0012 uf
422-15	S-232-001152	Capacitor, Mylar .0015 uf
422-16	S-232-001182	Capacitor, Mylar .0018 uf
422-17	S-232-001222	Capacitor, Mylar .0022 uf
422-18	S-232-001272	Capacitor, Mylar .0027 uf
422-19	S-232-001332	Capacitor, Mylar .0033 uf
422-20	S-232-001392	Capacitor, Mylar .0039 uf
422-21	S-232-001472	Capacitor, Mylar .0047 uf
422-22	S-232-001562	Capacitor, Mylar .0056 uf
422-23	S-232-001682	Capacitor, Mylar .0068 uf
422-24	S-232-001822	Capacitor, Mylar .0082 uf
422-25	S-232-001103	Capacitor, Mylar .010 uf
422-26	S-232-001123	Capacitor, Mylar .012 uf
422-27	S-232-001153	Capacitor, Mylar .015 uf
422-28	S-232-001183	Capacitor, Mylar .018 uf
422-29	S-232-001223	Capacitor, Mylar .022 uf
422-30	S-232-001273	Capacitor, Mylar .027 uf
422-31	S-232-001333	Capacitor, Mylar .033 uf
422-32	S-232-001393	Capacitor, Mylar .039 uf
422-33	S-232-001473	Capacitor, Mylar .047 uf
422-34	S-232-001563	Capacitor, Mylar .056 uf
422-35	S-232-001683	Capacitor, Mylar .068 uf
422-36	S-232-001823	Capacitor, Mylar .082 uf
422-37	S-232-001104	Capacitor, Mylar .10 uf
422-38	S-232-001124	Capacitor, Mylar .12 uf
422-39	S-232-001154	Capacitor, Mylar .15 uf
422-40	S-232-001184	Capacitor, Mylar .18 uf
422-41	S-232-001224	Capacitor, Mylar .22 uf
422-42	S-232-001274	Capacitor, Mylar .27 uf
422-43	S-232-001334	Capacitor, Mylar .33 uf
422-44	S-232-001394	Capacitor, Mylar .39 uf
422-45	S-232-001474	Capacitor, Mylar .47 uf

MODEL 124 SERIES PARTS LIST

REAL RHYTHM

ITEM NO.	PART NUMBER	PARTS DESCRIPTION
422-46	S-232-001564	Capacitor, Mylar .56 uf
422-47	S-232-001684	Capacitor, Mylar .68 uf
422-48	S-232-001824	Capacitor, Mylar .82 uf
422-49	S-232-001105	Capacitor, Mylar 1.0 uf
422-50	S-211-025001	Capacitor 1 uf @ 25V
422-51	S-211-025010	Capacitor 10 uf @ 25V
422-52	S-211-025100	Capacitor 100 uf @ 25V
422-53	S-244-356841	Capacitor, Tantalum .68 uf
422-54	S-244-351052	Capacitor, Tantalum 1 uf
422-55	S-205-000471	Capacitor, CER 470 pf
422-56	S-205-000102	Capacitor, CER .001 uf
422-57	S-205-000222	Capacitor, CER .0022 uf
422-58	S-205-000472	Capacitor, CER .0047 uf
422-59	S-205-000103	Capacitor, CER .01 uf
422-60	S-218-000203	Capacitor, CER .02 uf
422-61	S-218-000303	Capacitor, CER .03 uf
422-62	S-218-000503	Capacitor, CER .05 uf
422-63	A-507-060149	IC Socket Nest - 12 Conn.
422-64	A-507-060150	IC Socket Nest - 8 Conn.